Water Pipe
Gas Pipe
Flanged Pipe

Twelve Foot Lengths

Sixteen Foot Lengths

NATIONAL CAST IRON PIPE CO.

Water and Gas Specials
General Castings

M. L. Engle
July 1920

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NOTICE

We carry stocks of pipe and specials in Chicago, Kansas City and other convenient locations and can make prompt shipment of less than car load quantities.

M. L. Engr

NATIONAL CAST IRON PIPE COMPANY

CATALOG 1019

of

CAST IRON PIPE

AND FITTINGS

FOR

WATER, GAS AND OTHER USES

National Cast Iron Pipe Co.
122 SO. MICHIGAN AVE.
CHICAGO, ILL.

General Offices and Foundries

BIRMINGHAM, ALABAMA

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CHICAGO
KANSAS CITY
SAN FRANCISCO

AMERICAN WATER WORKS ASSOCIATION

Specifications for Cast Iron Pipe and Special Castings

Adopted May 12, 1908

Description of Pipes

SECTION 1. The pipes shall be made with hub and spigot joints and shall accurately conform to the dimensions given in Tables Nos. 1 and 2. They shall be straight and shall be true circles in section, with their inner and outer surfaces concentric, and shall be of the specified dimensions in outside diameter. They shall be at least 12 feet in length, exclusive of socket.

Pipes with thickness and weight intermediate between the classes in Table No. 2 shall be made of the same outside diameter as the next heavier class. Pipes with thickness and weight less than shown by Table No. 2 shall be made of the same outside diameter as the Class A pipe; and pipes with thickness and weight more than shown by Table No. 2 shall be made of the same outside diameter as the Class D pipe.

All pipes having the same outside diameter shall have the same inside diameter at both ends. The inside diameter of the lighter pipes of each standard outside diameter shall be gradually increased for a distance of about 6 inches from each end of the pipe so as to obtain the required standard thickness and weight for each size and class of pipe.

For pipes of each size from 4-inch to 24-inch inclusive, there shall be two standards of outside diameter, and for pipes from 30-inch to 60-inch inclusive, there shall be four standards of outside diameter, as shown by Table No. 1.

For pipes 4-inch to 12-inch inclusive, one class of special castings shall be furnished, made from Class D pattern. Those having spigot ends shall have outside diameters of spigot ends midway between the two standards of outside diameter as shown by Table No. 1, and shall be tapered back for a distance of 6 inches.

For pipes from 14-inch to 24-inch inclusive, two classes of special castings shall be furnished; Class B special castings with Classes A and B pipes, and Class D special castings with Classes C and D pipes; the former shall have cast on them the letters "AB" and the latter "CD." For pipes 30-inch to 60-inch inclusive, four classes of special castings shall be furnished, one for each class of pipe, and shall have cast on them the letter of the class to which they belong.

Allowable Variation in Diameter of Pipes and Sockets

Section 2. Especial care shall be taken to have the sockets of the required size. The sockets and spigots will be tested by circular gauges, and no pipe will be received which is defective in joint-room from any cause. The diameters of the sockets and the outside diameters of the spigot ends of the pipes shall not vary from the standard dimensions by more than .06 of an inch for pipes 16 inches or less in diameter; .08 of an inch for 18-inch, 20-inch and 24-inch pipes; .10 of an inch for 30-inch, 36-inch and 42-inch pipes; .12 of an inch for 48-inch, and .15 of an inch for 54-inch and 60-inch pipes.

Allowable Variation in Thickness

Section 3. For pipes whose standard thickness is less than 1 inch, the thickness of metal in the body

of the pipe shall not be more than .08 of an inch less than the standard thickness, and for pipes whose standard tickness is 1 inch or more, the variation shall not exceed .10 of an inch, except that for spaces not exceeding 8 inches in length in any direction, variations from the standard thickness of .02 of an inch in excess of the allowance above given shall be permitted. For special castings of standard patterns a variation of 50 per cent greater than allowed for straight pipes shall be permitted.

Defective Spigots May Be Cut

SECTION 4. Defective spigot ends on pipes 12 inches or more in diameter may be cut off in a lathe and a half round wrought-iron band shrunk into a groove cut in the end of the pipe. Not more than 12 per cent of the total number of accepted pipes of each size shall be cut and banded, and no pipe shall be banded which is less than 11 feet in length, exclusive of the socket.

In case the length of a pipe differs from 12 feet, the standard weight of the pipe shall be modified in accordance therewith.

Special Castings

SECTION 5. All special castings shall be made in accordance with the cuts and the dimensions given in the tables forming a part of these specifications.

The diameters of the sockets and the external diameters of the spigot ends of the special castings shall not vary from the standard dimensions by more than .12 of an inch for castings 16 inches or less in diameter; .15 of an inch for 18-inch, 20-inch and 24-inch; .20 of an inch for 30-inch, 36-inch and 42-inch and .24 of an inch for 48-inch, 54-inch and 60-inch. These variations apply only to special castings made from standard patterns.

The flanges on all manhole castings and manhole covers shall be faced true and smooth, and drilled to receive bolts of the sizes given in the tables. The manufacturer shall furnish and deliver all bolts for bolting on the manhole covers, the bolts to be of the sizes shown on plans and made of the best quality of mild steel, with hexagonal heads and nuts and sound, well-fittings threads.

Marking

SECTION 6. Every pipe and special casting shall have distinctly cast upon it the initials of the maker's name. When cast especially to order, each pipe larger than 4-inch may also have cast upon it figures showing the year in which it was cast and a number signifying the order in point of time in which it was cast, the figures denoting the year being above and the number below, thus:

1908	1908	1908
1	2	3

etc., also any initials, not exceeding four, which may be required by the purchaser. The letters and figures shall be cast on the outside and shall not be less than 2 inches in length and $\frac{1}{8}$ of an inch in relief for pipes 8 inches in diameter and larger. For smaller sizes of pipes the letters may be 1 inch in length. The weight and the class letter shall be conspicuously painted in white in the inside of each pipe and special casting after the coating has become hard.

Allowable Percentage of Variation in Weight

SECTION 7. No pipe shall be accepted the weight of which shall be less than the standard weight by more than 5 per cent for pipes, 16 inches or less in diameter, and 4 per cent for pipes more than 16 inches in diameter, and no excess above the standard

weight of more than the given percentage for the several sizes shall be paid for. The total weight to be paid for shall not exceed for each size and class of pipe received the sum of the standard weights of the same number of pieces of the given size and class by more than 2 per cent.

No special casting shall be accepted the weight of which shall be less than the standard weight by more than 10 per cent for pipes 12 inches or less in diameter, and 8 per cent for larger sizes, except that curves, Y-pieces and breeches pipe may be 12 per cent below the standard weight, and no excess above the standard weight of more than the above percentages for the several sizes will be paid for. These variations apply only to castings made from the standard patterns.

Quality of Iron

SECTION 8. All pipes and special castings shall be made of cast iron of good quality, and of such character as shall make the metal of the castings strong, tough and of even grain, and soft enough to satisfactorily admit of drilling and cutting. The metal shall be made without any admixture of cinder iron or other inferior metal, and shall be remelted in a cupola or air furnace.

The contractor shall have the right to make and break three bars from each heat or run of metal, and the test shall be based upon the average results of the three bars. Should the dimensions of the three bars differ from those given below, a proper allowance therefor shall be made in the results of the tests.

Tests of Material

SECTION 9. Specimen bars of the metal used, each being 26 inches long by 2 inches wide and 1 inch thick, shall be made without charge as often as the

engineer may direct, and in default of definite instructions, the contractor shall make and test at least one bar from each heat or run of metal. The bars when placed flatwise upon supports 24 inches apart, and loaded in the center, shall support a load of 2,000 pounds, and show a deflection of not less than .30 of an inch before breaking; or if preferred, tensile bars shall be made which will show a breaking point of not less than 20,000 pounds per square inch.

Casting of Pipe

SECTION 10. The straight pipes shall be cast in dry sand molds in a vertical position. Pipes 16 inches or less in diameter shall be cast with the hub end up or down, as specified in the proposals. Pipes 18 inches or more in diameter shall be cast with the hub end down.

The pipes shall not be stripped or taken from the pit while showing color of heat, but shall be left in the flasks for a sufficient length of time to prevent unequal contraction by subsequent exposure.

Quality of Castings

SECTION 11. The pipes and special castings shall be smooth, free from scales, lumps, blisters, sand holes and defects of every nature which unfit them for the use for which they are intended. No plugging or filling will be allowed.

Cleaning and Inspection

SECTION 12. All pipes and special castings shall be thoroughly cleaned and subjected to a careful hammer inspection. No casting shall be coated unless entirely clean and free from rust, and approved in these respects by the engineer immediately before being dipped.

Coating

SECTION 13. Every pipe and special casting shall be coated inside and out with coal-tar pitch varnish. The varnish shall be made from coal tar. To this material sufficient oil shall be added to make a smooth coating, tough and tenacious when cold, and not brittle nor with any tendency to scale off.

Each casting shall be heated to a temperature of 300 degrees Fahrenheit immediately before it is dipped, and shall possess not less than this temperature at the time it is put in the vat. The ovens in which the pipes are heated shall be so arranged that all portions of the pipe shall be heated to an even temperature. Each casting shall remain in the bath at least five minutes.

The varnish shall be heated to a temperature of 300 degrees Fahrenheit (or less if the engineer shall so order), and shall be maintained at this temperature during the time the casting is immersed.

Fresh pitch and oil shall be added when necessary to keep the mixture at the proper consistency, and the vat shall be emptied of its contents and refilled with fresh pitch when deemed necessary by the engineer. After being coated the pipe shall be carefully drained of the surplus varnish. Any pipe or special casting that is to be recoated shall first be thoroughly scraped and cleaned.

Hydrostatic Test

SECTION 14. When the coating has become hard, the straight pipes shall be subjected to a proof by hydrostatic pressure, and, if required by the engineer, they shall also be subjected to a hammer test under this pressure.

The pressure to which the different sizes and classes of pipes shall be subjected are as follows:

	20-Inch Diameter and Larger Pounds per Square Inch	Less than 20-Inch Diameter Pounds per Square Inch
Class A Pipe.....	150	300
Class B Pipe.....	200	300
Class C Pipe.....	250	300
Class D Pipe.....	300	300

Weighing

SECTION 15. The pipes and special castings shall be weighed for payment under the supervision of the engineer after the application of the coal-tar pitch varnish. If desired by the engineer, the pipes and special castings shall be weighed after their delivery, and the weights so ascertained shall be used in the final settlement, provided such weighing is done by a legalized weighmaster. Bids shall be submitted and a final settlement made upon the basis of a ton of 2,000 pounds.

Contractor to Furnish Men and Material

SECTION 16. The contractor shall provide all tools, testing machines, materials and men necessary for the required testing, inspection and weighing at the foundry of the pipe and special castings; and should the purchaser have no inspector at the works, the contractor shall, if required by the engineer, furnish a sworn statement that all of the tests have been made as specified; this statement to contain the results of the tests upon the test bars.

Power of Engineer to Inspect

SECTION 17. The engineer shall be at liberty at all times to inspect the material at the foundry, and the molding, casting and coating of the pipe and special castings. The forms, sizes, uniformity and

conditions of all pipe and other castings herein referred to shall be subject to his inspection and approval, and he may reject, without proving, any pipe or other casting which is not in conformity with the specifications or drawings.

Inspector to Report

SECTION 18. The inspector at the foundry shall report daily to the foundry office all pipes and special castings rejected, with the causes for rejection.

Castings to Be Delivered Sound and Perfect

SECTION 19. All the pipes and other castings must be delivered in all respects sound and conformable to these specifications. The inspection shall not relieve the contractor of any of his obligations in this respect, and any defective pipes or other castings which may have passed the engineer at the works or elsewhere shall be at all times liable to rejection when discovered, until the final completion and adjustment of the contract; provided, however, that the contractor shall not be held liable for pipes or special castings found to be cracked after they have been accepted at the agreed point of delivery. Care shall be taken in handling the pipes not to injure the coating, and no pipes or other material of any kind shall be placed in the pipes during transportation or at any time after they have received the coating.

Definition of the Word "Engineer"

SECTION 20. Wherever the word "engineer" is used herein it shall be understood to refer to the engineer or inspector acting for the purchaser and to his properly authorized agents, limited by the particular duties entrusted to them.

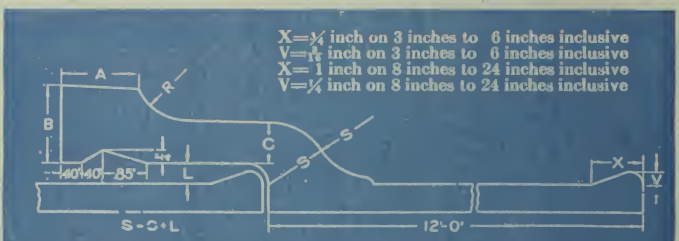
STANDARD DIMENSIONS OF PIPE

BELL AND SPIGOT

CLASSES A, B, C, D.

A. W. W. A. STANDARD

Table No. 1



Nominal Diam. Inches	Classes	Actual Outside Diam. Inches	Diam. of Sockets		Depth of Sockets		A	B	C
			Pipe Inches	Special Castings Inches	Pipe Inches	Special Castings Inches			
3	A	3.80	4.60	4.66	3.50	3.50	1.25	1.30	.65
3	B-C-D	3.96	4.76	4.66	3.50	3.50	1.25	1.30	.65
4	A	4.80	5.60	5.70	3.50	4.00	1.50	1.30	.65
4	B-C-D	5.00	5.80	5.70	3.50	4.00	1.50	1.30	.65
6	A	6.90	7.70	7.80	3.50	4.00	1.50	1.40	.70
6	B-C-D	7.10	7.90	7.80	3.50	4.00	1.50	1.40	.70
8	A-B	9.05	9.85	10.00	4.00	4.00	1.50	1.50	.75
8	C-D	9.30	10.10	10.00	4.00	4.00	1.50	1.50	.75
10	A-B	11.10	11.90	12.10	4.00	4.00	1.50	1.50	.75
10	C-D	11.40	12.20	12.10	4.00	4.00	1.50	1.60	.80
12	A-B	13.20	14.00	14.20	4.00	4.00	1.50	1.60	.80
12	C-D	13.50	14.30	14.20	4.00	4.00	1.50	1.70	.85
14	A-B	15.30	16.10	16.10	4.00	4.00	1.50	1.70	.85
14	C-D	15.65	16.45	16.45	4.00	4.00	1.50	1.80	.90
16	A-B	17.40	18.40	18.40	4.00	4.00	1.75	1.80	.90
16	C-D	17.80	18.80	18.80	4.00	4.00	1.75	1.90	1.00
18	A-B	19.50	20.50	20.50	4.00	4.00	1.75	1.90	.95
18	C-D	19.92	20.92	20.92	4.00	4.00	1.75	2.10	1.05
20	A-B	21.60	22.60	22.60	4.00	4.00	1.75	2.00	1.00
20	C-D	22.06	23.06	23.06	4.00	4.00	1.75	2.30	1.15
24	A-B	25.80	26.80	26.80	4.00	4.00	2.00	2.10	1.05
24	C-D	26.32	27.32	27.32	4.00	4.00	2.00	2.50	1.25

NOTE:—Dimensions are in inches.

The American Water Works Association specifications show Classes E, F, Gand H, tables of dimensions of which we will furnish on application.

PRICE AND THICKNESSES

BELL AND SPIGOT CAST IRON PIPE

Twelve and Sixteen-Foot Lengths

A. W. W. A. STANDARD

Table No. 2

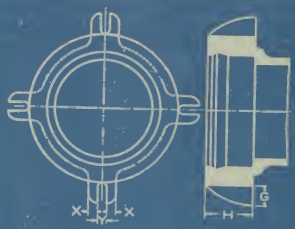
Nominal Inside Diameter Inches	CLASS A 100-Foot Head 43 Pounds Pressure			CLASS B 200-Foot Head 86 Pounds Pressure			CLASS C 300-Foot Head 130 Pounds Pressure			CLASS D 400-Foot Head 173 Pounds Pressure		
	Thickness Inches	Price per Foot		Thickness Inches	Price per Foot		Thickness Inches	Price per Foot		Thickness Inches	Price per Foot	
		12-Foot Lengths	16-Foot Lengths		12-Foot Lengths	16-Foot Lengths		12-Foot Lengths	16-Foot Lengths		12-Foot Lengths	16-Foot Lengths
3	.39	$ .75	.....	.42	$ .85	.....	.45	$ .85	.....	.48	$ .90	.....
4	.42	1.05	$1.05	.45	1.10	$1.10	.48	1.20	$1.20	.52	1.30	$1.30
6	.44	1.60	1.60	.48	1.70	1.70	.51	1.85	1.85	.55	1.95	1.95
8	.46	2.20	2.20	.51	2.45	2.45	.56	2.65	2.65	.60	2.85	2.85
10	.50	2.90	2.90	.57	3.25	3.25	.62	3.60	3.60	.68	3.90	3.90
12	.54	3.70	3.70	.62	4.20	4.20	.68	4.70	4.70	.75	5.10	5.10
14	.57	4.60	.....	.66	5.25	.....	.74	5.95	.....	.82	6.60	.....
16	.60	5.55	.....	.70	6.40	.....	.80	7.35	.....	.89	8.10	.....
18	.64	6.60	.....	.75	7.65	.....	.87	8.95	.....	.96	9.80	.....
20	.67	7.65	.....	.80	8.95	.....	.92	10.65	.....	1.03	11.70	.....
24	.76	10.45	.....	.89	11.90	.....	1.04	14.25	.....	1.16	15.65	.....

STANDARD SPECIAL CASTINGS FOR WATER

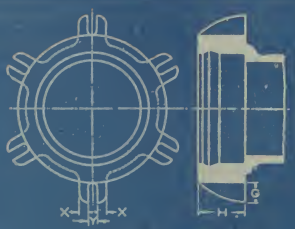
STANDARD LUGS

Numbers and Weights of Lugs on Outlets of Different Sizes

A. W. W. A. STANDARD



4 Lugs 12-14 Inches



6 Lugs 16-24 Inches

Nominal Diameter Outlet Inches	Number of Pairs of Lugs	Approximate Weight Lugs on One Bell Pounds	Nominal Diameter Outlet Inches	Number of Pairs of Lugs	Approximate Weight Lugs on One Bell Pounds
12	4	32	18	6	56
14	4	32	20	6	56
16	6	56	24	6	56

Two pairs of lugs are placed on the vertical axis of each bell, the others at equal distances around circumference. H is equal depth of bell on all sizes.

G equals 2.50 inches, X equals 1.25 inches, Y equals 1.63 inches for 12 to 24 inches, inclusive.

All weights are approximate.

WEIGHT AND THICKNESSES

BELL AND SPIGOT CAST IRON PIPE

Twelve and Sixteen Foot Lengths

A. W. W. A. STANDARD

Nominal Inside Diam., Inches	CLASS A 100-Feet Head 43 Pounds Pressure					CLASS B 200-Feet Head 86 Pounds Pressure					CLASS C 300-Feet Head 130 Pounds Pressure					CLASS D 400-Feet Head 173 Pounds Pressure				
	Thickness, Inches	Weight of 12-ft. per		Weight of 16-ft. per		Thickness, Inches	Weight of 12-ft. per		Weight of 16-ft. per		Thickness, Inches	Weight of 12-ft. per		Weight of 16-ft. per		Thickness, Inches	Weight of 12-ft. per		Weight of 16-ft. per	
		Foot	L'gth	Foot	L'gth		Foot	L'gth	Foot	L'gth		Foot	L'gth	Foot	L'gth		Foot	L'gth	Foot	L'gth
3	.39	14.5	175			.42	16.2	194			.45	17.1	205			.48	18.0	216		
4	.42	20.0	240	19.7	315	.45	21.7	260	21.2	340	.48	23.3	280	22.8	365	.52	25.0	300	24.4	390
6	.44	30.8	370	30.3	485	.48	33.3	400	32.5	520	.51	35.8	430	35.0	560	.55	38.3	460	37.5	600
8	.46	42.9	515	42.2	675	.51	47.5	570	46.6	745	.56	52.1	625	50.9	815	.60	55.8	670	54.7	875
10	.50	57.1	685	55.9	895	.57	63.8	765	62.5	1000	.62	70.8	850	69.4	1110	.68	76.7	920	75.3	1205
12	.54	72.5	870	71.2	1140	.62	82.1	985	80.6	1290	.68	91.7	1100	90.0	1440	.75	100.0	1200	98.4	1575
14	.57	89.6	1075			.66	102.5	1230			.74	116.7	1400			.82	129.2	1550		
16	.60	108.3	1300			.70	125.0	1500			.80	143.8	1725			.89	158.3	1900		
18	.64	129.2	1550			.75	150.0	1800			.87	175.0	2100			.96	191.7	2300		
20	.67	150.0	1800			.80	175.0	2100			.92	208.3	2500			1.03	229.2	2750		
24	.76	204.2	2450			.89	233.3	2800			1.04	279.2	3350			1.16	308.7	3680		

NOTE:—The difference in weight per foot of 12 feet and 16 feet pipe is due to the fact that the weight of the bell in the longer length is spread over more feet. Each foot without the bell weighs the same in both lengths.

Weights are approximate.

NATIONAL CAST IRON PIPE CO.

WEIGHT AND THICKNESSES

BELL AND SPIGOT CAST IRON PIPE

Twelve and Sixteen Foot Lengths

A. W. W. A. STANDARD

Nominal Inside Diam., Inches	CLASS E 500-Feet Head 217 Pounds Pressure					CLASS F 600-Feet Head 260 Pounds Pressure					CLASS G 700-Feet Head 304 Pounds Pressure					CLASS H 800-Feet Head 347 Pounds Pressure				
	Thickness, Inches	Weight of 12-ft. per		Weight of 16-ft. per		Thickness, Inches	Weight of 12-ft. per		Weight of 16-ft. per		Thickness, Inches	Weight of 12-ft. per		Weight of 16-ft. per		Thickness, Inches	Weight of 12-ft. per		Weight of 16-ft. per	
		Foot	L'gth	Foot	L'gth		Foot	L'gth	Foot	L'gth		Foot	L'gth	Foot	L'gth		Foot	L'gth	Foot	L'gth
6	.58	41.7	500	39.3	629	.61	43.3	520	42.0	672	.65	47.1	565	44.5	712	.69	49.6	595	47.5	760
8	.66	61.7	740	58.9	942	.71	65.7	790	63.3	1013	.75	70.8	850	67.1	1074	.80	75.0	900	70.7	1131
10	.74	86.3	1035	81.5	1304	.80	92.1	1105	87.5	1400	.86	100.9	1210	94.3	1509	.92	106.7	1280	101.2	1619
12	.82	113.8	1365	107.5	1720	.89	122.1	1465	116.9	1870	.97	135.4	1625	126.0	2016	1.04	143.8	1725	135.5	2168
14	.90	145.0	1740			.99	157.5	1890			1.07	174.2	2090			1.16	186.7	2240		
16	.98	179.6	2155			1.08	195.4	2345			1.18	219.2	2620			1.27	232.5	2790		
18	1.07	220.4	2645			1.17	238.4	2860			1.28	267.1	3205			1.39	286.7	3440		
20	1.15	263.0	3155			1.27	286.3	3435			1.39	320.8	3850			1.51	344.6	4135		
24	1.31	359.6	4315			1.45	392.9	4715			1.75					1.88				

NOTE:—The difference in weight per foot of 12 and 16 feet pipe is due to the fact that the weight of the bell in the longer length is spread over more feet. Each foot without the bell weighs the same in both lengths.

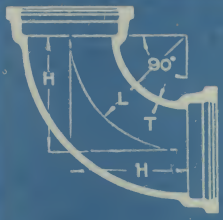
Weights are approximate.

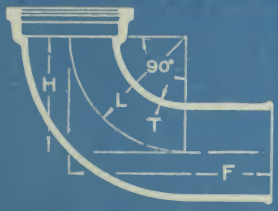
NATIONAL CAST IRON PIPE CO.

STANDARD SPECIAL CASTINGS FOR WATER

ONE-FOURTH CURVES

A. W. W. A. STANDARD





¼ equals 90°

Nominal Diameter Inches	Class	Dimensions Inches			PRICE EACH	
		T	L	F	One Bell	Two Bells
3	D	.48	16	24	$ 9.70	$10.50
4	D	.52	16	24	11.80	12.50
6	D	.55	16	24	17.25	18.00
8	D	.60	16	26	24.50	25.50
10	D	.68	16	28	32.50	33.00
12	D	.75	16	28	41.50	42.00
14	B	.66	18	30	57.50	56.50
14	D	.82	18	30	62.50	60.50
16	B	.70	24	36	85.00	84.50
16	D	.89	24	36	93.00	91.50
18	B	.75	24	36	118.00	117.50
18	D	.96	24	36	128.00	126.00
20	B	.80	24	36	143.00	142.00
20	D	1.03	24	36	155.00	153.00
24	B	.89	30	42	202.00	200.00
24	D	1.16	30	42	221.00	219.00

NOTE:—Unless otherwise specified ¼ curves are furnished with Bell and Spigot Ends. L equals H all sizes.

STANDARD SPECIAL CASTINGS FOR WATER

ONE-EIGHTH CURVES

A. W. W. A. STANDARD

Bell and Spigot
⅛ equals 45°

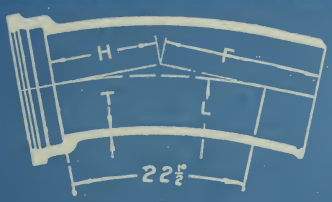
Nominal Diameter Inches	Class	Dimensions—Inches			PRICE EACH	
		T	L	H	One Bell	Two Bells
3	D	.48	24	9.94	$ 9.10	$ 9.75
4	D	.52	24	9.94	9.80	10.25
6	D	.55	24	9.94	12.00	12.50
8	D	.60	24	9.94	15.75	17.00
10	D	.68	24	9.94	23.00	24.25
12	D	.75	24	9.94	32.00	34.25
14	B	.66	36	14.91	46.00	48.00
14	D	.82	36	14.91	50.00	52.00
16	B	.70	36	14.91	59.50	62.00
16	D	.89	36	14.91	65.00	68.00
18	B	.75	36	14.91	76.50	79.50
18	D	.96	36	14.91	83.50	86.50
20	B	.80	48	19.88	109.00	112.00
20	D	1.03	48	19.88	120.00	123.00
24	B	.89	60	24.85	161.00	165.00
24	D	1.16	60	24.85	178.00	183.00

F equals H plus 6 inches on one-eighth curves of all sizes listed.
Unless otherwise specified, one-eighth curves are furnished with bell and spigot ends.

STANDARD SPECIAL CASTINGS FOR WATER

ONE-SIXTEENTH CURVES

A. W. W. A. STANDARD



Bell and Spigot
$\frac{1}{16}$ equals 22½°

Nominal Diameter Inches	Class	Dimensions, Inches			PRICE, EACH	
		T	L	H	One Bell	Two Bells
3	D	.48	48	9.55	$ 9.10	$ 9.75
4	D	.52	48	9.55	9.80	10.25
6	D	.55	48	9.55	12.00	12.50
8	D	.60	48	9.55	15.75	17.00
10	D	.68	48	9.55	23.00	24.25
12	D	.75	48	9.55	32.00	34.25
14	B	.66	72	14.32	43.50	48.00
14	D	.82	72	14.32	47.00	52.00
16	B	.70	72	14.32	56.00	62.00
16	D	.89	72	14.32	61.50	68.00
18	B	.75	72	14.32	73.00	79.50
18	D	.96	72	14.32	78.50	86.50
20	B	.80	96	19.10	105.00	112.00
20	D	1.03	96	19.10	114.00	123.00
24	B	.89	120	23.87	155.00	165.00
24	D	1.16	120	23.87	171.00	183.00

F equals H plus 6 inches on all sixteenth curves on sizes up to 12 inches. F equals H on all other prices listed.

Bell and Spigot Ends will be supplied unless otherwise specified.

STANDARD SPECIAL CASTINGS FOR WATER

ONE THIRTY-SECOND CURVES

A. W. W. A. STANDARD

Bell and Spigot
$\frac{1}{32}$ equals 11¼°

Nominal Diameter Inches	Class	Dimensions—Inches			PRICE EACH	
		T	L	H	One Bell	Two Bells
3	D	.48	120	11.82	$ 9.10	$10.00
4	D	.52	120	11.82	9.80	11.00
6	D	.55	120	11.82	12.00	13.50
8	D	.60	120	11.82	15.75	18.25
10	D	.68	120	11.82	22.50	25.75
12	D	.75	120	11.82	32.00	36.00
14	B	.66	180	17.73	46.00	50.50
14	D	.82	180	17.73	50.50	55.25
16	B	.70	180	17.73	60.00	65.50
16	D	.89	180	17.73	66.00	72.00
18	B	.75	180	17.73	77.00	84.00
18	D	.96	180	17.73	84.00	91.50
20	B	.80	240	23.64	111.00	119.00
20	D	1.03	240	23.64	123.00	132.00
24	B	.89	240	23.64	156.00	166.00
24	D	1.16	240	23.64	171.00	184.00

H equals F.
Bell and spigot ends will be supplied unless otherwise specified.

STANDARD SPECIAL CASTINGS FOR WATER

ONE SIXTY-FOURTH CURVES

A. W. W. A. STANDARD

Bell and Spigot
1/64 equals 5⅝°

Nominal Diameter Inches	Class	T	L	H	PRICE LIST One Bell
20	B	.80	480	23.58	$111.00
20	D	1.03	480	23.58	123.00
24	B	.89	480	23.58	156.00
24	D	1.16	480	23.58	171.00

H equals F

LIST ON SPECIAL FITTINGS

All Special Bell and Spigot Fittings made to order, sizes not listed, will be charged on following basis:

Number of Fittings ordered.....	1	2	3	4	5	6 or more of one size
Per cent advance in the list of nearest standard Fittings.	50	40	30	20	10	no advance

Fittings having one or more flanged openings take Flanged Fitting price. The largest openings always govern price.

STANDARD SPECIAL CASTINGS FOR WATER

BASE ELLS

A. W. W. A. STANDARD

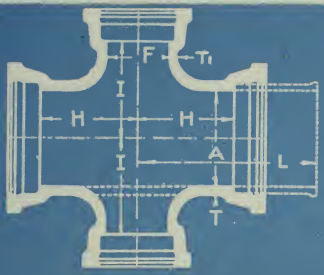
Nominal Diameter Inches	Class	L-H	S	F	N	V	Z	PRICE, EACH	
								Bell and Bell	Bell and Spigot
3	D	16	24	5.00	8.00	4.50	.72	$15.50	$14.50
4	D	16	24	5.50	9.00	5.00	.78	18.00	17.25
6	D	16	24	6.50	11.00	7.50	.83	23.25	21.00
8	D	16	26	7.50	13.50	9.50	.90	48.00	46.50
10	D	16	28	9.00	16.00	11.50	1.02	63.75	60.00
12	D	16	28	10.00	19.00	13.50	1.13	108.75	90.00
14	D	18	30	12.00	21.00	16.00	.99	135.00	108.00
16	D	24	36	13.00	23.50	18.00	1.04	157.50	127.50
18	D	24	36	14.00	25.00	20.00	1.12	180.00	168.75
20	D	24	36	15.00	27.50	22.00	1.20	240.00	232.50
24	D	30	42	17.50	32.00	26.50	1.33	345.00	330.00

Templates for base foundation bolts on application.
Furnished with bell and spigot ends unless otherwise specified.

STANDARD SPECIAL CASTINGS FOR WATER

STANDARD BRANCHES

A. W. W. A. STANDARD



All Bell

Nominal Diam. Inches		Class	Dimensions, Inches			PRICE EACH	
A	F		H	L	I	3-Way Branches with 2 or 3 Bells	4-Way Branches with 3 or 4 Bells
3	3	D	10	22	10	$13.50	$15.25
4	3	D	11	23	11	15.25	16.75
4	4	D	11	23	11	15.75	17.50
6	3	D	12	24	12	18.50	22.75
6	4	D	12	24	12	19.25	23.75
6	6	D	12	24	12	20.25	25.50
8	4	D	13	25	13	27.00	31.50
8	6	D	13	25	13	28.00	33.00
8	8	D	13	25	13	29.00	35.50
10	4	D	14	26	14	37.50	41.50
10	6	D	14	26	14	38.00	43.00
10	8	D	14	26	14	39.00	45.00
10	10	D	14	26	14	40.50	47.50
12	4	D	15	27	15	50.50	53.50
12	6	D	15	27	15	52.00	55.00
12	8	D	15	27	15	52.50	56.50
12	10	D	15	27	15	53.50	58.50
12	12	D	15	27	15	54.50	60.50
14	4	B	16	28	16	61.50	62.50
14	4	D	16	28	16	68.00	69.50
14	6	B	16	28	16	62.00	64.00
14	6	D	16	28	16	69.00	72.50
14	8	B	16	28	16	63.00	66.00
14	8	D	16	28	16	70.50	74.00
14	10	B	16	28	16	64.00	67.50
14	10	D	16	28	16	71.50	77.50

T and T^1 standard class thicknesses.

NOTE:—Unless otherwise specified branches will be furnished with bell all around. Spigot outlets on order.

STANDARD SPECIAL CASTINGS FOR WATER

STANDARD BRANCHES—(Continued)

A. W. W. A. STANDARD

Nominal Diam. Inches		Class	Dimensions, Inches			PRICE EACH	
A	F		H	L	I	3-Way Branches with 2 or 3 Bells	4-Way Branches with 3 or 4 Bells
14	12	B	16	28	16	$65.50	$70.00
14	12	D	16	28	16	72.50	79.50
14	14	B	16	28	16	66.00	72.00
14	14	D	16	28	16	75.00	84.50
16	4	B	17	29	17	77.00	78.00
16	4	D	17	29	17	86.00	87.50
16	6	B	17	29	17	78.00	79.00
16	6	D	17	29	17	87.00	89.50
16	8	B	17	29	17	78.50	80.50
16	8	D	17	29	17	83.50	92.50
16	10	B	17	29	17	79.50	82.00
16	10	D	17	29	17	90.50	97.00
16	12	B	17	29	17	81.00	84.50
16	12	D	17	29	17	91.00	98.00
16	14	B	17	29	17	81.50	85.50
16	14	D	17	29	17	92.00	100.00
16	16	B	17	29	17	83.00	89.50
16	16	D	17	29	17	96.50	110.00
18	4	B	18	30	18	93.50	97.00
18	4	D	18	30	18	104.00	109.00
18	6	B	18	30	18	94.00	98.00
18	6	D	18	30	18	105.00	110.00
18	8	B	18	30	18	94.50	99.50
18	8	D	18	30	18	106.00	114.00
18	10	B	18	30	18	95.50	101.00
18	10	D	18	30	18	108.00	118.00
18	12	B	18	30	18	96.00	103.00
18	12	D	18	30	18	110.00	121.00
18	14	B	18	30	18	97.00	104.00
18	14	D	18	30	18	111.00	122.00
18	16	B	18	30	18	98.00	107.00
18	16	D	18	30	18	112.00	125.00
18	18	B	18	30	18	100.00	112.00
18	18	D	18	30	18	115.00	131.00
20	4	B	19	31	19	113.00	119.00

STANDARD SPECIAL CASTINGS FOR WATER

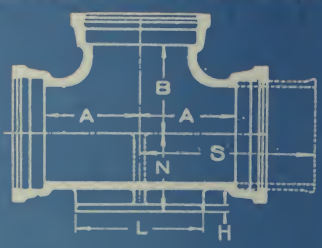
STANDARD BRANCHES—(Continued)

Nominal Diam. Inches		Class	Dimensions, Inches			PRICE EACH	
A	F		H	L	I	3-Way Branches with 2 or 3 Bells	4-Way Branches with 3 or 4 Bells
20	4	D	19	31	19	$126.00	$133.00
20	6	B	19	31	19	113.00	119.00
20	6	D	19	31	19	127.00	134.00
20	8	B	19	31	19	114.00	120.00
20	8	D	19	31	19	128.00	137.00
20	10	B	19	31	19	115.00	121.00
20	10	D	19	31	19	130.00	141.00
20	12	B	19	31	19	116.00	124.00
20	12	D	19	31	19	132.00	144.00
20	14	B	19	31	19	116.00	124.00
20	14	D	19	31	19	135.00	150.00
20	16	B	19	31	19	117.00	127.00
20	16	D	19	31	19	136.00	151.00
20	18	B	19	31	19	119.00	130.00
20	18	D	19	31	19	136.00	153.00
20	20	B	19	31	19	121.00	135.00
20	20	D	19	31	19	141.00	163.00
24	6	B	21	33	21	145.00	152.00
24	6	D	21	33	21	164.00	172.00
24	8	B	21	33	21	146.00	154.00
24	8	D	21	33	21	165.00	175.00
24	10	B	21	33	21	147.00	156.00
24	10	D	21	33	21	167.00	179.00
24	12	B	21	33	21	148.00	158.00
24	12	D	21	33	21	169.00	182.00
24	14	B	21	33	21	150.00	162.00
24	14	D	21	33	21	171.00	187.00
24	16	B	21	33	21	152.00	166.00
24	16	D	21	33	21	173.00	192.00
24	18	B	21	33	21	153.00	169.00
24	18	D	21	33	21	181.00	205.00
24	20	B	21	33	21	153.00	170.00
24	20	D	21	33	21	189.00	220.00
24	24	B	21	33	21	156.00	175.00
24	24	D	21	33	21	196.00	233.00

STANDARD SPECIAL CASTINGS FOR WATER

BASE TEES

A. W. W. A. STANDARD



Nominal Diameter Inches	Class	A-B	S	N	L	F	H	PRICE, EACH	
								Bell and Bell	Bell and Spigot
3	D	10	22	4.50	7.50	4.00	.63	$22.50	$21.00
4	D	11	23	6.50	9.00	5.00	.68	25.25	24.00
6	D	12	24	5.50	11.00	7.50	.72	33.75	32.00
8	D	13	25	7.50	13.50	9.50	.77	58.50	55.50
10	D	14	26	9.00	16.00	11.50	.86	70.50	67.00
12	D	15	27	10.00	19.00	13.50	.93	86.25	82.00
14	D	16	28	12.00	21.00	16.00	.99	145.50	138.25
16	D	17	29	13.00	23.50	18.00	1.05	168.75	160.25
18	D	18	30	14.00	25.00	20.00	1.13	238.50	226.50
20	D	19	31	15.00	27.50	22.00	1.20	300.00	285.00
24	D	21	33	17.50	27.50	26.50	1.34	395.25	375.50

Templates for base foundation bolts on application.
Furnished with bells all around unless otherwise specified.

STANDARD SPECIAL CASTINGS FOR WATER

Y BRANCHES

A.W.W.A. STANDARD

Two Bells

Nominal Diameter Inches		Class	L	N	PRICE EACH
H	F				
3	3	D	9.50	10.50	$ 15.50
4	4	D	10.50	11.50	17.25
6	4	D	12.00	12.00	22.25
6	6	D	13.00	13.00	23.25
8	4	D	14.00	14.00	31.00
8	6	D	15.00	14.00	32.50
8	8	D	16.00	14.00	34.50
10	6	D	17.00	15.50	47.00
10	8	D	18.00	15.50	49.50
10	10	D	18.50	15.50	51.50
12	6	D	19.00	15.50	64.50
12	8	D	21.50	15.50	68.00
12	10	D	21.50	15.50	69.50
12	12	D	21.50	15.50	72.00
14	6	B	22.00	13.00	78.00
14	6	D	22.00	13.00	91.00
14	8	B	22.50	13.75	80.50
14	8	D	22.50	13.75	93.50
14	10	B	23.00	14.50	83.00
14	10	D	23.00	14.50	96.50
14	12	B	23.50	15.25	86.00
14	12	D	23.50	15.25	99.50
14	14	B	24.00	16.00	87.00
14	14	D	24.00	16.00	103.00

Standard Y Branches have two bells and spigot and the angle of the branch to the line in a standard Y is 45 degrees.

STANDARD SPECIAL CASTINGS FOR WATER

Y BRANCHES—(Continued)

Nominal Diameter Inches		Class	L	N	PRICE EACH
H	F				
16	8	B	23.00	17.50	$104.00
16	8	D	23.00	17.50	122.00
16	10	B	25.00	17.50	107.00
16	10	D	25.00	17.50	126.00
16	12	B	27.00	17.50	111.00
16	12	D	27.00	17.50	130.00
16	14	B	29.00	17.50	114.00
16	14	D	29.00	17.50	134.00
16	16	B	31.00	17.50	118.00
16	16	D	31.00	17.50	141.00
18	10	B	32.00	18.00	149.00
18	10	D	32.00	18.00	164.00
18	12	B	32.00	18.00	150.00
18	12	D	32.00	18.00	167.00
18	14	B	32.00	18.00	152.00
18	14	D	32.00	18.00	170.00
18	16	B	34.00	18.00	158.00
18	16	D	34.00	18.00	176.00
18	18	B	34.00	18.00	161.00
18	18	D	34.00	18.00	181.00
20	12	B	37.00	18.75	199.00
20	12	D	37.00	18.75	217.00
20	14	B	37.00	18.75	200.00
20	14	D	37.00	18.75	221.00
20	16	B	37.00	18.75	203.00
20	16	D	37.00	18.75	225.00
20	18	B	37.00	18.75	206.00
20	18	D	37.00	18.75	223.00
20	20	B	37.00	18.75	210.00
20	20	D	37.00	18.75	235.00
24	16	B	40.00	12.75	261.00
24	16	D	40.00	12.75	289.00
24	18	B	40.00	18.75	268.00
24	18	D	40.00	18.75	305.00
24	20	B	40.00	18.75	280.00
24	20	D	40.00	18.75	326.00
24	24	B	42.00	19.75	300.00
24	24	D	42.00	19.75	352.00

Standard Y branches have two bells and spigot and the angle of the branch to the line in a standard Y is 45 degrees.

STANDARD SPECIAL CASTINGS FOR WATER

REDUCERS AND INCREASERS

A. W. W. A. STANDARD

Spigot Ends | Large End Bell | Small End Bell

Nominal Diam. In.		L	Class	PRICE EACH		
A	H			Spigot Ends	Large End Bell	Small End Bell
4	3	12	D	$12.50	$13.50	$13.25
6	4	18	D	12.50	13.50	13.25
8	4	18	D	15.00	16.50	16.00
8	6	18	D	16.00	17.50	17.00
10	4	18	D	21.50	23.25	22.50
10	6	18	D	22.50	24.25	23.50
10	8	18	D	23.50	25.50	25.00
12	4	18	D	29.50	31.50	30.50
12	6	18	D	30.50	32.50	31.50
12	8	18	D	31.50	33.50	33.00
12	10	18	D	33.00	35.00	35.00
14	6	20	B	40.50	43.00	41.50
14	6	20	D	42.50	45.00	43.50
14	8	20	B	41.50	44.50	43.00
14	8	20	D	43.50	46.50	45.00
14	10	20	B	43.00	46.00	44.50
14	10	20	D	45.50	48.00	47.00
14	12	20	B	45.00	48.00	47.00
14	12	20	D	47.00	50.00	49.00
16	6	20	B	52.00	55.50	53.00
16	6	20	D	54.50	58.50	55.50

Specify when ordering whether spigot ends, large end bell or small end bell. Bells can be furnished on each end when desired.

STANDARD SPECIAL CASTINGS FOR WATER

REDUCERS AND INCREASERS—(Continued)

A. W. W. A. STANDARD

Nominal Diam. In.		L	Class	PRICE EACH		
A	H			Spigot Ends	Large End Bell	Small End Bell
16	8	20	B	$53.00	$57.00	$55.00
16	8	20	D	56.00	60.00	57.50
16	10	20	B	55.00	58.50	56.50
16	10	20	D	57.50	61.50	59.00
16	12	20	B	56.50	60.50	58.50
16	12	20	D	59.00	63.00	61.00
16	14	20	B	56.50	60.50	59.50
16	14	20	D	61.00	65.00	64.00
18	8	20	B	63.00	67.50	64.50
18	8	20	D	66.00	71.00	67.50
18	10	20	B	64.50	69.00	66.00
18	10	20	D	67.50	72.50	69.00
18	12	20	B	66.50	71.00	68.50
18	12	20	D	69.50	74.50	71.50
18	14	20	B	66.50	71.00	69.50
18	14	20	D	71.50	76.50	74.00
18	16	20	B	68.00	72.50	72.00
18	16	20	D	73.50	78.50	77.50
20	10	26	B	78.50	84.00	80.50
20	10	26	D	83.00	89.00	84.50
20	12	26	B	81.00	86.00	82.50
20	12	26	D	85.00	91.50	87.00
20	14	26	B	80.50	86.00	83.50
20	14	26	D	87.50	93.50	90.50
20	16	26	B	82.50	88.00	86.50
20	16	26	D	90.00	96.00	94.00
20	18	26	B	85.00	90.00	89.00
20	18	26	D	92.50	98.50	97.50
24	14	26	B	98.00	105.00	101.00
24	14	26	D	105.00	114.00	109.00
24	16	26	B	99.50	107.00	104.00
24	16	26	D	109.00	117.00	113.00
24	18	26	B	102.00	109.00	107.00
24	18	26	D	112.00	120.00	116.00
24	20	26	B	105.00	111.00	110.00
24	20	26	D	115.00	123.00	121.00

Specify when ordering whether spigot ends, large end bell or small end bell

STANDARD SPECIAL CASTINGS FOR WATER

STANDARD BLOW-OFF BRANCHES

A. W. W. A. STANDARD

Nominal Diameter Inches		Class	L	H	Thickness Inches		PRICE EACH
E	F				T	T'	
8	4	D	12	7	.60	.52	$ 52.25
10	4	D	12	8	.68	.52	59.50
12	4	D	12	10	.75	.52	70.25
12	6	D	12	10	.75	.55	70.25
14	4	B	12	11	.66	.52	101.00
14	4	D	12	11	.82	.52	119.00
14	6	B	12	11	.66	.55	101.00
14	6	D	12	11	.82	.55	119.00
16	4	B	12	12	.70	.52	127.75
16	4	D	12	12	.89	.52	153.00
16	6	B	12	12	.70	.55	127.75
16	6	D	12	12	.89	.55	153.00
18	4	B	12	13	.75	.52	179.75
18	4	D	12	13	.96	.52	216.00
18	6	B	12	13	.75	.55	179.75
18	6	D	12	13	.96	.55	216.00
20	4	B	12	14	.80	.52	196.50
20	4	D	12	14	1.03	.52	243.00
20	6	B	12	14	.80	.55	196.50
20	6	D	12	14	1.03	.55	258.25
24	6	B	12	16	.89	.55	324.00
24	6	D	12	16	1.16	.55	258.25
24	8	B	12	16	.89	.60	263.75
24	8	D	12	16	1.16	.60	330.00

STANDARD SPECIAL CASTINGS FOR WATER

STANDARD SLEEVES

A. W. W. A. STANDARD

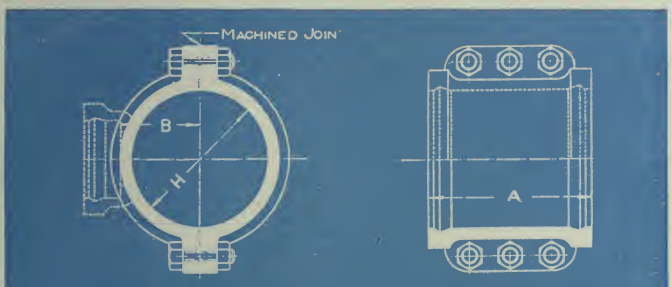
Nominal Diameter Inches	Class	A	L	T	PRICE EACH
3	D	4.66	8	.56	$3.80
4	D	5.80	10	.65	4.85
4	D	5.80	15	.65	5.90
6	D	7.90	10	.70	6.90
6	D	7.90	15	.70	8.20
8	D	10.10	12	.75	11.25
8	D	10.10	15	.75	12.00
10	D	12.20	12	.80	14.25
10	D	12.20	18	.80	17.75
12	D	14.30	14	.85	20.25
12	D	14.30	18	.85	24.00
14	B	16.20	15	.85	26.50
14	B	16.20	18	.85	29.50
14	D	16.50	15	.90	27.50
14	D	16.50	18	.90	31.50
16	B	18.50	15	.90	33.00
16	B	18.50	24	.90	42.50
16	D	18.90	15	1.00	34.50
16	D	18.90	24	1.00	45.00
18	B	20.60	15	.95	38.50
18	B	20.60	24	.95	50.00
18	D	21.00	15	1.05	40.50
18	D	21.00	24	1.05	53.00
20	B	22.70	15	1.00	44.50
20	B	22.70	24	1.00	57.50
20	D	23.10	15	1.15	48.00
20	D	23.10	24	1.15	62.50
24	B	26.90	15	1.05	53.00
24	B	26.90	24	1.05	69.50
24	D	27.40	15	1.25	58.50
24	D	27.40	24	1.25	76.50

STANDARD SPECIAL CASTINGS FOR WATER

SPLIT SLEEVES

(With and Without Branches)

A. W. W. A. STANDARD



Nominal Diameter Inches	Class	A	H	Diameter Branch Inches	BOLTS		LIST PRICE
					Size	No.	Without Branch
3	D	10	4.70	.....	.....	6	10.00
4	D	10	5.70	.....	.75	6	16.00
6	D	10	7.80	4	.88	6	17.00
8	D	12	10.00	4	1 00	6	23.00
10	D	12	12.10	4	1.13	6	36.00
12	D	14	14.20	6	1.13	8	40.00
14	B	15	16.10	6	1.00	8	48.50
14	D	15	16.45	6	1.13	8	52.50
16	B	15	18.40	6	1.13	8	53.00
16	D	15	18.80	6	1.13	8	59.00
18	B	15	20.50	6	1.13	8	60.05
18	D	15	20.92	6	1.13	8	75.50
20	B	15	22.60	6	1.13	8	99.00
20	D	15	23.08	6	1.13	8	116.00
24	B	15	26.80	6	1.13	8	111.50
24	D	15	27.32	6	1.25	8	136.00

Prices on application for Split Sleeves with Branch.
Bolts are not furnished for Split Sleeves.

STANDARD SPECIAL CASTINGS FOR WATER

STANDARD OFFSETS

A. W. W. A. STANDARD

Bell and Spigot

Nominal Diameter Inches	Class	L	F	H	I	T	PRICE EACH
4	D	35.85	2.00	8	10	.52	$17.45
6	D	46.25	2.00	14	10	.55	23.25
8	D	48.00	2.00	15	10	.60	52.75
10	D	49.70	2.00	16	10	.68	55.50
12	D	51.45	2.00	17	10	.75	82.50
14	B	53.70	2.50	18	10	.66	102.25
14	D	53.70	2.50	18	10	.82	128.00
16	B	55.40	2.50	19	10	.70	109.50
16	D	55.40	2.50	19	10	.89	139.25

Bell and spigot will be supplied unless otherwise specified.

STANDARD SPECIAL CASTINGS FOR WATER

CUTTING-IN BRANCHES

Nominal Diameter Inches		Will Take Pipe of		Laying Length Inches	A	PRICE, EACH	
D	D^1	Inside Diameter Inches	Maximum Thickness Inches			Tees	Crosses
3	3	3	.48	16	10	$11.50	$14.75
4	4	4	.52	19	11	19.75	25.50
6	6	6	.55	21	12½	32.00	38.25
8	8	8	.60	23	13	42.00	54.25
10	10	10	.68	24	14	53.50	70.75
12	12	12	.75	24	15	124.50	137.00
14	14	14	.82	31	16	.....	.....
16	16	16	.89	31	17	.....	.....

The specials are enlarged back of the bell, so they can be easily slipped over the pipe and drawn up into position ready for caulking. Only two joints are required; there is less labor, less excavating, less time for the water to be turned off, and a variation of an inch or two, in the length of piece cut out, does not matter.

STANDARD SPECIAL CASTINGS FOR WATER PLUGS

A. W. W. A. STANDARD

Nominal Diameter Inches	Class	N	E	L	Number of Ribs	PRICE EACH	
						Without Tapping	With 2 inch and Smaller Tapping
3	D	4.00	5.25	5.25	....	$ 1.20	$ 5.50
4	D	4.90	5.28	5.50	....	1.20	5.50
6	D	7.00	7.38	5.50	....	1.95	7.00
8	D	9.15	9.65	5.50	2	3.10	8.75
10	D	11.20	11.70	6.00	2	4.70	9.50
12	D	13.30	13.80	6.00	2	6.60	12.00
14	B	15.30	15.80	6.00	2	8.90	14.25
14	D	15.65	16.15	6.00	2	9.00	17.50
16	B	17.40	17.90	6.50	3	12.25	.....
16	D	17.80	18.30	6.50	3	12.50	.....
18	B	19.50	20.00	6.50	3	16.75	.....
18	D	19.92	20.42	6.50	3	17.25	.....
20	B	21.60	22.10	6.50	3	24.50	.....
20	D	22.06	22.56	6.50	3	24.75	.....
24	B	25.92	26.30	8.00	4	43.00	.....
24	D	26.44	26.82	8.00	4	48.00	.....

Net extra for larger tapping, 2½" **.50c**; 3" **.75c**; 4" **$1.00**; 5" **$1.25**; 6" **$1.50**.

STANDARD SPECIAL CASTINGS FOR WATER

CAPS

A. W. W. A. STANDARD

4 to 10 inches

12 to 24 inches

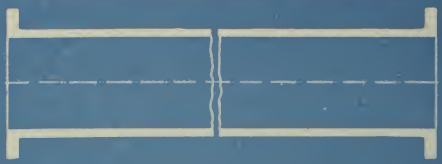
Nominal Diameter Inches	Class	N	L	Price each without Tapping	Price each with 2 in. and smaller Tapping
3	D	4.00	4.75	$3.75	$7.50
4	D	4.00	5.70	4.05	8.75
6	D	4.00	7.80	5.40	10.00
8	D	4.00	10.00	7.60	12.00
10	D	4.00	12.10	10.25	14.75
12	D	4.00	14.20	13.50	17.50
14	B	4.00	16.10	17.25	21.00
14	D	4.00	16.45	17.50	24.25
16	B	4.00	18.40	22.25	.....
16	D	4.00	18.80	23.00	.....
18	B	4.00	20.50	27.50	.....
18	D	4.00	20.92	28.50	.....
20	B	4.00	22.60	33.50	.....
20	D	4.00	23.06	35.00	.....
24	B	4.00	26.80	43.00	.....
24	D	4.00	27.32	45.50	.....

Net extra for larger Tapping—2½″, **50c**; 3″, **75c**; 4″, **$1.00**; 5″, **$1.25**; 6″, **$1.50**.

In Class B, 12 and 14-inch have 4 pairs of lugs. In Class D, 14 to 24-inch have six pairs of lugs.

STANDARD FLANGED PIPE FOR WATER

CLASSES A AND B



Nominal Diameter, Inches	Diameter of Flange, Inches	Thickness of Flange, Inches	Diameter Bolt Circle, Inches	Number of Bolts	Diameter of Bolt, Inches	Class A— 100 ft. Head 43 lbs. pressure		Class B— 200 ft. Head 86 lbs. pressure	
						Thickness, Inches	Price per Foot	Thickness Inches	Price per Foot
3	7.50	3/4	6 00	4	5/8	.39	$1.50	.42	$1.65
4	9.00	15/16	7.50	8	5/8	.42	2.05	.45	2.30
6	11.00	1	9.50	8	3/4	.44	3.15	.48	3.50
8	13.50	1 1/8	11.75	8	3/4	.46	4.35	.51	4.80
10	16.00	1 3/16	14.25	12	7/8	.50	5.90	.57	6.65
12	19.00	1 1/4	17.00	12	7/8	.54	7.70	.62	8.75
14	21.00	1 3/8	18.75	12	1	.57	9.40	.66	10.80
16	23.50	1 7/16	21.25	16	1	.60	11.30	.70	13.10
18	25.00	1 9/16	22.75	16	1 1/8	.64	13.40	.75	15.60
20	27.50	1 11/16	25.00	20	1 1/8	.67	15.60	.80	18.50
24	32.00	1 7/8	29.50	20	1 1/4	.76	21.20	.89	24.70

Flanges drilled to American 1914 Standard Templates. Send template for other required drilling. Bolt holes 1/8 inch larger than bolts. Pipe made in 12-foot lengths and faced 1/16 inch short for gaskets. Shorter lengths to order.

STANDARD FLANGED PIPE FOR WATER

CLASSES C AND D

Nominal Diameter, Inches	Diameter of Flange, Inches	Thickness of Flange, Inches	Diameter Bolt Circle, Inches	Number of Bolts	Diameter of Bolt, Inches	Class C 300 ft. Head 130 lbs. pressure		Class D 400 ft. Head 173 lbs. pressure	
						Thickness, Inches	Price per Foot	Thickness, Inches	Price per Foot
3	7.50	3/4	6.00	4	5/8	.45	$1.75	.48	$1.85
4	9.00	13/16	7.50	8	5/8	.48	2.40	.52	2.60
6	11.00	1	9.50	8	3/4	.51	3.70	.55	3.95
8	13.50	1 1/8	11.75	8	3/4	.56	5.40	.60	5.75
10	16.00	1 3/16	14.25	12	7/8	.62	7.35	.68	8.00
12	19.00	1 1/4	17.00	12	7/8	.68	9.70	.75	10.65
14	21.00	1 3/8	18.75	12	1	.74	12.25	.82	13.50
16	23.50	1 7/16	21.25	16	1	.80	15.10	.89	16.70
18	25.00	1 9/16	22.75	16	1 1/8	.87	18.25	.96	20.00
20	27.50	1 11/16	25.00	20	1 1/8	.92	21.50	1.03	23.90
24	32.00	1 7/8	29.50	20	1 1/4	1.04	29.05	1.16	32.25

Flanges drilled to American 1914 Standard Templates. Send template for other required drilling. Bolt holes 1/8-inch larger than bolts. Pipe made in 12-foot lengths and faced 1/16-inch short for gaskets. Shorter lengths to order.

STANDARD FLANGE AND BELL PIPE
AND
STANDARD FLANGE AND SPIGOT PIPE
SHORT LENGTHS

Nominal Diameter Inch	Length Inches	Flange and Bell Wt. Pounds	Flange and Spigot Wt. Pounds	Nom'l Diam. Inch	Length Inches	Flange and Bell Wt. Pounds	Flange and Spigot Wt. Pounds
4	6	45	.....	12	36	412	326
4	12	56	33	12	48	505	420
4	18	68	45	12	60	599	514
4	24	79	56	12	72	691	606
4	30	90	67	14	6	210	.....
4	36	102	79	14	12	270	174
4	48	125	102	14	18	329	234
4	60	147	124	14	24	389	293
4	72	170	147	14	30	449	353
6	6	63	.....	14	36	508	412
6	12	81	48	14	48	627	531
6	18	99	66	14	60	747	651
6	24	116	83	14	72	866	770
6	30	134	101	16	6	272	.....
6	36	151	118	16	12	346	218
6	48	187	154	16	18	419	291
6	60	222	189	16	24	493	365
6	72	257	224	16	30	567	439
8	6	97	.....	16	36	641	512
8	12	123	71	16	48	788	660
8	18	149	97	16	60	935	807
8	24	174	123	16	72	1083	955
8	30	200	148	18	6	315	.....
8	36	225	174	18	12	404	252
8	48	277	225	18	18	494	341
8	60	328	276	18	24	583	430
8	72	379	327	18	30	672	519
10	6	131	.....	18	36	761	609
10	12	166	101	18	48	940	787
10	18	202	137	18	60	1118	965
10	24	238	172	18	72	1296	1144
10	30	274	208	20	6	388	.....
10	36	309	244	20	12	494	304
10	48	381	315	20	18	600	411
10	60	452	387	20	24	706	517
10	72	523	458	20	30	812	623
12	6	178	.....	20	36	919	729
12	12	224	139	20	48	1131	942
12	18	271	186	20	60	1343	1154
12	24	318	233	20	72	1555	1367
12	30	365	280				

Weights are approximate. 1914 American Standard.
Prices on application.

STANDARD FLANGED SPECIAL CASTINGS FOR WATER

STANDARD FLANGED CURVES

¼-Curve

⅛-Curve

$\frac{1}{16}$-Curve

Nominal Diam. Inches	Class	T	One-fourth Curve 90°			One-eighth Curve 45°			One-sixteenth Curve 22½°		
			L	N	Weight Pounds	L	N	Weight Pounds	L	N	Weight Pounds
4	D	.52	16	16	69	24	9.94	57	48	9.55	57
6	D	.55	16	16	101	24	9.94	83	48	9.55	83
8	D	.60	16	16	147	24	9.94	121	48	9.55	121
10	D	.68	16	16	209	24	9.94	170	48	9.55	170
12	D	.75	16	16	287	24	9.94	238	48	9.55	233
14	B	.66	18	18	315	36	14.91	341	72	14.32	341
14	D	.82	18	18	387	36	14.91	419	72	14.32	419
16	B	.70	24	24	470	36	14.91	418	72	14.32	418
16	D	.89	24	24	604	36	14.91	528	72	14.32	528
18	B	.75	24	24	558	36	14.91	484	72	14.32	434
18	D	.96	24	24	707	36	14.91	612	72	14.32	612
20	B	.80	24	24	670	48	19.88	670	96	19.10	670
20	D	1.03	24	24	851	48	19.88	851	96	19.10	851
24	B	.89	30	30	1067	60	24.85	1066	120	23.87	1066
24	D	1.16	30	30	1377	60	24.85	1377	120	23.87	1377

All weights are approximate.
Flanges on these castings are American 1914 Standard.
Prices on application.

STANDARD FLANGED SPECIAL CASTINGS FOR WATER

ONE-FOURTH CURVE WITH BASE

Nominal Diameter Inches	A	N	F	L	Weight in Pounds
4	11	5.50	9.00	5.00	78
6	12	6.50	11.00	7.50	124
8	13	7.50	13.50	9.50	187
10	14	9.00	16.00	11.50	278
12	15	10.00	19.00	13.50	407
14	16	12.00	21.00	16.00	501
16	17	13.00	23.50	18.00	671
18	18	14.00	25.00	20.00	834
20	19	15.00	27.50	22.00	1042
24	21	17.50	32.00	26.50	1549

NOTE:—Can Furnish Base Tees with one or more Flanges.
Weights are approximate.
1914 American Standard.
Templates for foundation bolts sent on request.
Prices on application.

STANDARD FLANGED SPECIAL CASTINGS FOR WATER

STANDARD FLANGED TEES AND CROSSES

Nominal Diameter Inches		Class	H	N	Weight, Pounds	
E	F				Tees	Crosses
4	4	D	11.0	11.0	88	114
6	4	D	12.0	12.0	124	150
6	6	D	12.0	12.0	137	176
8	4	D	13.0	13.0	179	191
8	6	D	13.0	13.0	191	232
8	8	D	13.0	13.0	209	268
10	4	D	14.0	14.0	251	277
10	6	D	14.0	14.0	269	303
10	8	D	14.0	14.0	280	335
10	10	D	14.0	14.0	300	392
12	4	D	15.0	15.0	351	377
12	6	D	15.0	15.0	364	403
12	8	D	15.0	15.0	380	435
12	10	D	15.0	15.0	397	492
12	12	D	15.0	15.0	426	557
14	4	B	16.0	16.0	374	400
14	4	D	16.0	16.0	455	481
14	6	B	16.0	16.0	387	426
14	6	D	16.0	16.0	468	507
14	8	B	16.0	16.0	403	458

NOTE:—Can furnish Base Tees with one or more flanges.
All weights are approximate.
Flanges on these castings are American 1914 Standard.
Prices on application.

STANDARD FLANGED SPECIAL CASTINGS FOR WATER

STANDARD FLANGED TEES AND CROSSES

(Continued)

Nominal Diameter Inches		Class	H	N	Weight, Pounds	
E	F				Tees	Crosses
14	8	D	16.0	16.0	484	539
14	10	B	16.0	16.0	431	514
14	10	D	16.0	16.0	510	593
14	12	B	16.0	16.0	463	579
14	12	D	16.0	16.0	543	658
14	14	B	16.0	16.0	466	584
14	14	D	16.0	16.0	571	715
16	4	B	17.0	17.0	482	508
16	4	D	17.0	17.0	582	608
16	6	B	17.0	17.0	495	534
16	6	D	17.0	17.0	599	638
16	8	B	17.0	17.0	511	566
16	8	D	17.0	17.0	616	676
16	10	B	17.0	17.0	528	600
16	10	D	17.0	17.0	641	726
16	12	B	17.0	17.0	557	659
16	12	D	17.0	17.0	674	790
16	14	B	17.0	17.0	559	682
16	14	D	17.0	17.0	702	846
16	16	B	17.0	17.0	589	737
16	16	D	17.0	17.0	740	929
18	4	B	18.0	18.0	562	588
18	4	D	18.0	18.0	708	734
18	6	B	18.0	18.0	575	614
18	6	D	18.0	18.0	726	770
18	8	B	18.0	18.0	591	646
18	8	D	18.0	18.0	742	802
18	10	B	18.0	18.0	608	680
18	10	D	18.0	18.0	767	852
18	12	B	18.0	18.0	637	739
18	12	D	18.0	18.0	783	885
18	14	B	18.0	18.0	643	751
18	14	D	18.0	18.0	817	952
18	16	B	18.0	18.0	686	836
18	16	D	18.0	18.0	852	1022

All weights are approximate.
Flanges on these castings are American 1914 Standard.
Prices on application.

STANDARD FLANGED SPECIAL CASTINGS FOR WATER

STANDARD FLANGED TEES AND CROSSES
(Continued)

Nominal Diameter Inches		Class	H	N	Weight, Pounds	
E	F				Tees	Crosses
18	18	B	18.0	18.0	694	851
18	18	D	18.0	18.0	873	1063
20	6	B	19.0	19.0	713	752
20	6	D	19.0	19.0	900	944
20	8	B	19.0	19.0	729	784
20	8	D	19.0	19.0	916	976
20	10	B	19.0	19.0	746	818
20	10	D	19.0	19.0	941	1026
20	12	B	19.0	19.0	779	885
20	12	D	19.0	19.0	991	1127
20	14	B	19.0	19.0	789	899
20	14	D	19.0	19.0	1026	1196
20	16	B	19.0	19.0	824	974
20	16	D	19.0	19.0	1056	1256
20	18	B	19.0	19.0	833	995
20	18	D	19.0	19.0	1080	1303
20	20	B	19.0	19.0	873	1072
20	20	D	19.0	19.0	1103	1360
24	6	B	21.0	21.0	1013	1052
24	6	D	21.0	21.0	1300	1344
24	8	B	21.0	21.0	1029	1084
24	8	D	21.0	21.0	1316	1376
24	10	B	21.0	21.0	1046	1118
24	10	D	21.0	21.0	1341	1426
24	12	B	21.0	21.0	1079	1185
24	12	D	21.0	21.0	1391	1527
24	14	B	21.0	21.0	1091	1209
24	14	D	21.0	21.0	1426	1596
24	16	B	21.0	21.0	1124	1274
24	16	D	21.0	21.0	1454	1654
24	18	B	21.0	21.0	1135	1295
24	18	D	21.0	21.0	1574	1860
24	20	B	21.0	21.0	1175	1376
24	20	D	21.0	21.0	1630	1969
24	24	B	21.0	21.0	1244	1513
24	24	D	21.0	21.0	1744	2189

All weights are approximate.
Flanges on these castings are American 1914 Standard.
Prices on application.

STANDARD FLANGED SPECIAL CASTINGS FOR WATER

STANDARD FLANGED REDUCERS

Nominal Diameter Inches		Class	L	N	Approx. Weight Pounds
E	F				
6	4	D	18	4	88
6	4	D	12	2	67
8	4	D	18	4	111
8	4	D	12	2	79
8	6	D	18	4	124
8	6	D	12	2	91
10	4	D	18	4	142
10	4	D	12	2	103
10	6	D	18	4	160
10	6	D	12	2	115
10	8	D	18	4	183
10	8	D	12	2	132
12	4	D	18	4	183
12	4	D	12	2	123
12	6	D	18	4	200
12	6	D	12	2	147
12	8	D	18	4	223
12	8	D	12	2	163
12	10	D	18	4	256
12	10	D	12	2	187
14	6	B	26	4	243
14	6	B	20	2	189
14	6	D	26	4	288
14	6	D	20	2	217
14	8	B	26	4	272
14	8	B	20	2	212
14	8	D	26	4	317

Total length ascertained by adding to N's to L.
Weights are approximate.
Flanges on these castings are American 1914 Standard.
Prices on application.

STANDARD FLANGED SPECIAL CASTINGS FOR WATER

STANDARD FLANGED REDUCERS

(Continued)

Nominal Diameter Inches		Class	L	N	Approx. Weight Pounds
E	F				
14	8	D	20	2	241
14	10	B	26	4	313
14	10	B	20	2	244
14	10	D	26	4	358
14	10	D	20	2	274
14	12	B	26	4	360
14	12	B	20	2	282
14	12	D	26	4	407
14	12	D	20	2	313
16	6	B	26	4	286
16	6	B	20	2	220
16	6	D	26	4	320
16	6	D	20	2	257
16	8	B	26	4	315
16	8	B	20	2	244
16	8	D	26	4	375
16	8	D	20	2	283
16	10	B	26	4	356
16	10	B	20	2	276
16	10	D	26	4	415
16	10	D	20	2	316
16	12	B	26	4	405
16	12	B	20	2	315
16	12	D	26	4	465
16	12	D	20	2	355
16	14	B	26	4	402
16	14	B	20	2	316
16	14	D	26	4	506
16	14	D	20	2	391
18	8	B	26	4	348
18	8	B	20	2	268
18	8	D	26	4	416
18	8	D	20	2	314
18	10	B	26	4	392
18	10	B	20	2	301
18	10	D	26	4	457
18	10	D	20	2	348
18	12	B	26	4	439
18	12	B	20	2	340
18	12	D	26	4	506
18	12	D	20	2	388
18	14	B	26	4	435
18	14	B	20	2	341

Total length ascertained by adding N's to L.
All weights are approximate.
Flanges on these castings are American 1914 Standard.
Prices on application.

STANDARD FLANGED SPECIAL CASTINGS FOR WATER

STANDARD FLANGED REDUCERS
(Continued)

Nominal Diameter Inches		Class	L	N	Approx. Weight Pounds
E	F				
18	14	D	26	4	548
18	14	D	20	2	424
18	16	B	26	4	481
18	16	B	20	2	375
18	16	D	26	4	605
18	16	D	20	2	469
20	10	B	32	4	503
20	10	B	26	2	400
20	10	D	32	4	597
20	10	D	26	2	479
20	12	B	32	4	558
20	12	B	26	2	446
20	12	D	32	4	652
20	12	D	26	2	523
20	14	B	32	4	553
20	14	B	26	2	453
20	14	D	32	4	699
20	14	D	26	2	558
20	16	B	32	4	602
20	16	B	26	2	487
20	16	D	32	4	764
20	16	D	26	2	614
20	18	B	32	4	684
20	18	B	26	2	551
20	18	D	32	4	812
20	18	D	26	2	657
24	14	B	32	4	676
24	14	B	26	2	541
24	14	D	32	4	841
24	14	D	26	2	675
24	16	B	32	4	725
24	16	B	26	2	580
24	16	D	32	4	910
24	16	D	26	2	731
24	18	B	32	4	764
24	18	B	26	2	609
24	18	D	32	4	969
24	18	D	26	2	776
24	20	B	32	4	824
24	20	B	26	2	659
24	20	D	32	4	1048
24	20	D	26	2	840

Total length ascertained by adding N's to L.
All weights are approximate.
Flanges on these castings are American 1914 Standard.
Prices on application.

STANDARD SPECIAL FLANGED CASTINGS FOR WATER

BLANK FLANGES

Nominal Diameter Inches	Class	L	T²	T¹	Approximate Weight Pounds
3	D	7.50	.65	.85	9
4	D	9.00	.65	.91	14
6	D	11.00	.70	.96	23
8	D	13.50	.75	1.03	36
10	D	16.00	.80	1.15	55
12	D	19.00	.85	1.26	84
14	B	21.00	.85	1.12	94
14	D	21.00	.90	1.36	108
16	B	23.50	.90	1.18	134
16	D	23.50	1.00	1.47	159
18	B	25.00	.95	1.26	161
18	D	25.00	1.05	1.57	189
20	B	27.50	1.00	1.33	204
20	D	27.50	1.15	1.68	248
24	B	32.00	1.05	1.47	298
24	D	32.00	1.25	1.87	367

Blank Flanges, 3-14 inches, no Ribs; 16-24 inches, 3 Ribs.
Weights are approximate.
Flanges on these castings are American 1914 Standard.
Prices on application.

American Gas Institute

Standard Specifications for Cast Iron Pipe and Special Castings

Adopted October, 1911—October, 1913

Description of Pipe and Special Castings

Section 1. All pipe shall be made with bell and spigot joints. The pipe and special castings shall accurately conform to the dimensions given in the tables of the American Gas Institute Standards accompanying and forming a part of these specifications. The pipe shall be straight and of true circles in section, with their inner and outer surfaces concentric; and cast at least 12 feet in length, exclusive of socket or bell. In the case of pipe of different weight from those specified in the tables, the outside diameter of the body and bell dimensions shall conform to the tables.

Allowable Variation in Diameter

Section 2. All sockets and spigots shall be tested by circular gauges. All pipe and special castings shall be rejected which are defective in joint room, or which vary from standard dimensions in the diameters of the sockets and the outside diameters of spigots more than is given in the table below:

Size	Pipe	Special castings
16 in. or less	0.06 in.	0.12 in.
20 in. and 24 in.	0.08 in.	0.15 in.
30 in., 36 in. and 42 in.	0.10 in.	0.20 in.
48 in.	0.12 in.	0.24 in.

Allowable Variation in Thickness

Section 3. The variations allowed below the

standard thickness shall not be greater than that shown in the table below:

Size	Pipe	Special castings
8 in. or less	0.08 in.	0.10 in.
10 in. to 36 in.	0.08 in.	0.12 in.
42 in. and 48 in.	0.10 in.	0.15 in.

For all sizes of pipe and for specials 10 inches or larger, variations from the standard thickness of 0.02 inch in excess of the allowances above given, shall be permitted for spaces not exceeding 8 inches in length in any direction.

Treatment of Defective Spigots

SECTION 4. Defective spigot ends on pipe 12 inches or more in diameter may be cut off in a lathe, and a half-round wrought iron band shrunk into a groove cut in the end of the pipe. Not more than 12 per cent of the total number of accepted pipe of each size shall be cut and banded, and no pipe shall be banded which is less than 11 feet in length, exclusive of the socket. In the case the length of a pipe differs from 12 feet, the standard weight of the pipe given shall be modified in accordance therewith.

Marking

SECTION 5. Every pipe and special casting shall have distinctly cast upon it the initials of the maker's name. When cast especially to order, each pipe larger than 4 inches may also have cast upon it figures showing the year in which it was cast and a number signifying the order, in point of time, in which it was cast, the figures denoting the year being above and the number below thus:

1913	1913	1913
1	2	3

also any initials, not exceeding four, which may be required by the purchaser. The letters and figures

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shall be cast on the outside, and shall not be less than 2 inches in length and $\frac{1}{8}$ inch in relief, for pipe 8 inches in diameter and larger. For smaller sizes of pipe, the letters may be 1 inch in length. The weight shall be conspicuously painted in white on the inside of each pipe and special casting.

Allowable Percentage of Variation in Weight

SECTION 6. No pipe shall be accepted the weight of which shall be less than the standard weight by more than 5 per cent for pipe 16 inches or less in diameter, and 4 per cent for pipe more than 16 inches in diameter; and no excess above the standard weight of more than the given percentage for the several sizes shall be paid for. The total weight to be paid for shall not exceed for each size and class o pipe received, the sum of the standard weights of the same number of pieces of the given size and class by more than 2 per cent. No special casting shall be accepted, the weight of which shall be less than the standard weight, by more than 10 per cent for sizes 12 inches or less in diameter, and 8 per cent for larger sizes, except that curves and "Y" pieces 16 inches in diameter and larger may be 12 per cent below the standard weight; and no excess above the standard weight of more than the above percentages for the several sizes will be paid for.

Quality of Iron

SECTION 7. All pipe and special castings shall be made of cast iron of good quality and of such character as shall make the metal of the castings strong, tough and of even grain; and soft enough to satisfactorily admit of drilling and cutting. The metal shall be made without any admixture of cinder iron or other inferior metal and shall be re-melted in a cupola or air furnace.

Tests of Material

SECTION 8. Specimen bars of the metal used, each being 26 inches long by 2 inches wide and 1 inch thick, shall be made without charge as often as the engineer may direct, and in default of definite instructions, the foundry shall make and test at least one bar from each heat or run of metal. The bars, when placed flatwise upon supports 24 inches apart and loaded in the center, shall support a load of 1,800 pounds and show a deflection of not less than 0.30 inch before breaking; or, if preferred, tensile bars shall be made, which will show a breaking point of not less than 18,000 pounds per square inch. The foundry shall have the right to make and break three bars from each heat or run of metal, and the test shall be based on the average results of the three bars. Should the dimensions of the bars differ from those given above, a proper allowance therefor shall be made in the results of the tests.

Tests of Pipe

SECTION 9. All pipe, after having a general inspection, shall be subject to a water pressure test of at least 300 pounds per square inch for 16 inches and smaller, and at least 150 pounds per square inch for 20 inches and larger. If required by the engineer, they shall also be subjected to a hammer test under this pressure. Any pipe showing defects by leaking, sweating or otherwise, shall be rejected.

Casting of Pipe

SECTION 10. The pipe shall be cast vertically in dry sand molds and shall not be stripped or taken from the pit while showing color of heat, but shall be left in the flasks for a sufficient length of time to prevent unequal contraction due to subsequent exposure.

Quality of Castings

SECTION 11. The pipe and special castings shall be smooth, free from scales, lumps, blisters and sand holes and defects of every nature which unfit them for the use for which they are intended. No plugging, filling or burning in will be allowed without special permission.

Cleaning and Inspection

SECTION 12. All pipe and special castings shall be thoroughly cleaned and subjected to a careful hammer inspection.

Weighing

SECTION 13. The pipe and special castings shall be weighed for payment, under the supervision of the engineer. If desired by the engineer, the pipe and special castings shall be weighed after their delivery, and the weights so ascertained shall be used in the final settlement, provided such weighing is done by a legalized weigh master. Bids shall be submitted and a final settlement made upon the basis of a ton of 2,000 pounds.

Contractor to Furnish Men and Materials

SECTION 14. The contractor shall provide all tools, testing machines, materials and men necessary for the required testing, inspection and weighing at the foundry of the pipe and special castings; and should the purchaser have no inspector at the works, the contractor shall, if required by the engineer, furnish a sworn statement that all of the tests have been made as specified, this statement to contain the results of the tests upon the test bars.

Power of Engineer to Inspect

SECTION 15. The engineer shall be at liberty at all times to inspect the material at the foundry, and the molding and the casting of the pipe and special castings. The forms, sizes, uniformity and condition of all pipe and other castings herein referred to shall be subject to his inspection and approval, and he may reject, without proving, any pipe or other casting which is not in conformity with the specifications or drawings.

Inspector to Report

SECTION 16. The inspector at the foundry shall report daily to the foundry office, all pipe and special castings rejected, with the causes for rejection.

Castings to be Delivered Sound and Perfect

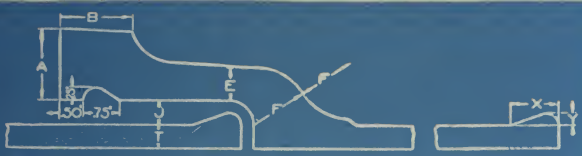
SECTION 17. All the pipe and other castings must be delivered in all respects sound and conformable to these specifications. The inspection shall not relieve the contractor of any of his obligations in this respect, and any defective pipe or other castings which may have passed the engineer, shall at all times be subject to rejection when discovered, until the final completion and adjustment of the contract; provided, however, that the contractor shall not be held liable for pipe or special castings found to be cracked after they have been accepted at the agreed point of delivery.

Definition of the Word "Engineer"

SECTION 18. Wherever the word "Engineer" is used herein it shall be understood to refer to the engineer or inspector acting for the purchaser, and to his properly authorized agents, limited by the particular duties intrusted to them.

STANDARD BELL AND SPIGOT GAS PIPE

AMERICAN GAS INSTITUTE STANDARD



X equals .75 inch for 4 and 6 inch; 1.00 inch for 8 to 24 inch.
Y equals .19 inch for 4 and 6 inch; .25 inch for 8 to 24 inch. F=E+J

Nominal Diameter Inches	Outside Diameter Inches	Thickness Inches	Diameter Sockets	Depth Sockets	Weight, Pounds Including Bell	
					Foot	Length
4	4.80	.40	5.80	4.00	19.33	232
6	6.90	.43	7.90	4.00	30.25	363
8	9.05	.45	10.05	4.00	42.08	505
10	11.10	.49	12.10	4.00	55.91	671
12	13.20	.54	14.20	4.50	73.83	886
16	17.40	.62	18.40	4.50	112.58	1351
20	21.60	.68	22.85	4.50	153.83	1846
24	25.80	.76	27.05	5.00	206.41	2477

STANDARD HEAVY GAS PIPE

X equals .75 inch for 4 and 6 inch; 1.00 inch for 8 to 24 inch.
Y equals .19 inch for 4 and 6 inch; .25 inch for 8 to 24 inch. S=C+L

Nominal Diameter Inches	Outside Diameter Inches	Thickness Inches	Diameter Sockets	Depth Sockets	Weight, Pounds Including Bell	
					Foot	Length
4	5.00	.42	5.80	4.00	20.0	240
6	7.10	.47	7.90	4.00	32.8	394
8	9.05	.49	9.85	4.00	45.3	544
10	11.10	.51	11.90	4.00	58.7	703
12	13.20	.57	14.00	4.50	76.1	913
16	17.40	.65	18.40	4.50	117.2	1406
20	21.60	.75	22.60	4.50	166.7	2000
24	25.80	.82	26.80	5.00	224.0	2688

Weights are approximate. Prices on application.

STANDARD SPECIAL CASTINGS FOR GAS

ONE-FOURTH CURVES

A. G. I. STANDARD

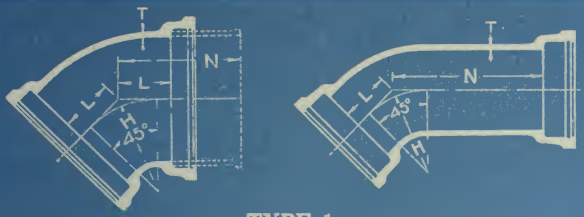
Nominal Diameter Inches	Dimensions in Inches				Approximate Weight	
	L	H	N	T	2 Bells	1 Bell
4	4.50	2.60	26	.40	61	68
6	6.25	4.25	26	.43	95	100
8	8.00	5.90	26	.45	139	149
10	9.75	7.65	26	.49	185	198
12	11.25	9.05	27	.54	267	278
16	17.00	14.50	32	.62	486	491
20	19.00	16.20	34	.68	699	707
24	21.00	18.20	36	.76	1002	1003

Weights are approximate. Prices on application.

STANDARD SPECIAL CASTINGS FOR GAS

LONG RADIUS ONE-EIGHTH CURVES

A. G. I. STANDARD



TYPE 1

Nominal Diameter Inches	Dimensions in Inches				Approximate Weight	
	L	H	N	T	2 Bells	1 Bell
4	3.16	3.04	23.00	.40	59	63
6	4.23	5.38	23.00	.43	90	97
8	5.31	7.75	23.00	.45	129	138
10	6.39	10.36	23.00	.49	168	183
12	7.22	12.12	24.00	.54	237	253
16	9.12	16.00	25.00	.62	397	410
20	11.03	19.87	27.25	.68	585	607
24	12.94	24.48	29.00	.76	856	874

TYPE 2

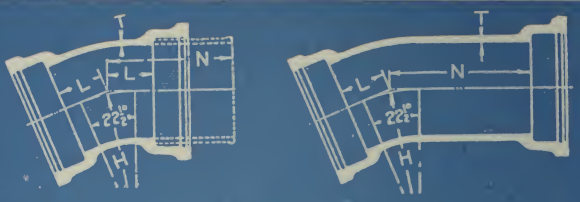
Nominal Diameter Inches	Dimensions in Inches				Approximate Weight
	L	H	N	T	
4	3.16	3.04	13.65	.40	74
6	4.23	5.38	14.48	.43	113
8	5.31	7.75	15.31	.45	161
10	6.39	10.36	16.14	.49	210
12	7.22	12.12	19.97	.54	291

Weights are approximate. Prices on application.

STANDARD SPECIAL CASTINGS FOR GAS

LONG RADIUS ONE-SIXTEENTH CURVES

A. G. I. STANDARD



TYPE 1

Nominal Diameter Inches	Dimensions in Inches				Approximate Weight	
	L	H	N	T	2 Bells	1 Bell
4	2.69	4.00	20.25	.40	58	58
6	3.53	7.70	20.75	.43	87	91
8	4.38	11.50	21.25	.45	124	130
10	5.22	15.70	22.00	.49	160	175
12	5.81	18.15	22.50	.54	223	239
16	7.27	24.00	23.75	.62	373	390
20	8.71	29.75	24.75	.68	538	559
24	10.16	37.00	26.00	.76	783	798

TYPE 2

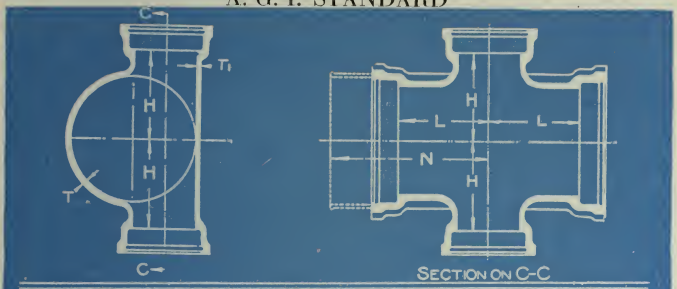
Nominal Diameter Inches	Dimensions in Inches				Approximate Weight Pounds
	L	H	N	T	
4	2.69	4.00	14.70	.40	75
6	3.53	7.70	15.53	.43	114
8	4.38	11.50	16.38	.45	162
10	5.22	15.70	17.25	.49	211
12	5.81	18.15	17.81	.54	290

Weights are approximate. Prices on application.

STANDARD SPECIAL CASTINGS FOR GAS

TEES AND CROSSES

A. G. I. STANDARD



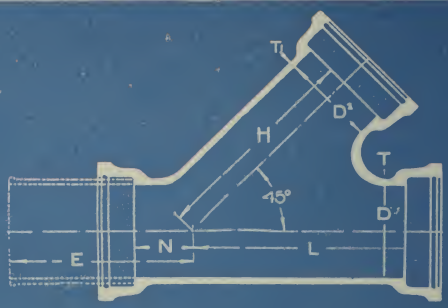
Nominal Diameter Inches		Dimensions in Inches			Thickness Inches		Approximate Weight			
							3-Way Branch		4-Way Branch	
D	D1	L	H	N	T	T1	2 Bells	3 Bells	2 Bells	3 Bells
4	4	8	8	26	.40	.40	106	105	138	137
6	4	8	8	26	.43	.40	144	138	174	169
6	6	8	8	26	.43	.43	156	151	200	194
8	4	10	10	26	.45	.40	194	192	226	224
8	6	10	10	26	.45	.43	208	206	254	251
8	8	10	10	26	.45	.45	223	221	284	282
10	4	12	11	26	.49	.40	253	251	287	285
10	6	12	12	26	.49	.43	267	266	315	314
10	8	12	12	26	.49	.45	283	282	348	346
10	10	12	12	26	.49	.49	296	295	373	372
12	4	14	13	27	.54	.40	343	350	379	385
12	6	14	13	27	.54	.43	359	366	409	416
12	8	14	13	27	.54	.45	376	383	443	450
12	10	14	14	27	.54	.49	390	397	471	478
12	12	14	14	27	.54	.54	410	417	512	519
16	6	14	14	29	.62	.43	536	534	582	580
16	8	14	14	29	.62	.45	552	549	612	610
16	10	14	14	29	.62	.49	563	561	636	634
16	12	17	17	32	.62	.54	655	652	768	765
16	16	17	17	32	.62	.62	709	707	877	875
20	6	15	15	29	.68	.43	724	730	767	774
20	8	15	15	29	.68	.45	738	745	796	802
20	10	15	15	29	.68	.49	749	755	817	824
20	12	19	19	34	.68	.54	898	893	1011	1006
20	16	19	19	34	.68	.62	953	947	1120	1115
20	20	19	19	34	.68	.68	1001	995	1216	1211
24	8	17	17	30	.76	.45	1023	1056	1081	1114
24	10	17	17	30	.76	.49	1034	1067	1103	1136
24	12	17	17	30	.76	.54	1056	1089	1147	1180
24	16	21	21	36	.76	.62	1289	1291	1456	1458
24	20	21	21	36	.76	.68	1336	1338	1552	1554
24	24	21	21	36	.76	.76	1403	1405	1684	1686

Weights are approximate. Prices on application.

STANDARD SPECIAL CASTINGS FOR GAS

Y BRANCHES

A. G. I. STANDARD



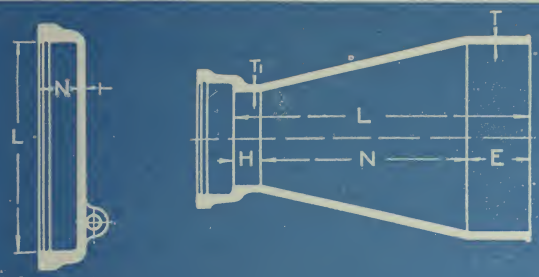
Nominal Diameter Inches		Dimensions in Inches				Thickness Inches		Approximate Weight Pounds	
D	D^1	L	H	N	E	T	T^1	3 Bells	2 Bells
4	4	11.15	11.15	3.16	23	.40	.40	105	109
6	4	15.50	15.25	4.25	23	.43	.40	154	161
6	6	15.50	15.50	4.25	23	.43	.43	171	178
8	4	19.30	18.80	5.31	23	.45	.40	215	224
8	6	19.30	19.05	5.31	23	.45	.43	234	243
8	8	19.30	19.30	5.31	23	.45	.45	254	263
10	4	22.75	22.00	6.75	23	.49	.40	285	297
10	6	22.75	22.25	6.75	23	.49	.43	305	317
10	8	22.75	22.50	6.75	23	.49	.45	327	339
10	10	22.75	22.75	6.75	23	.49	.49	347	360
12	4	26.75	26.00	7.25	23	.54	.40	396	406
12	6	26.75	26.25	7.25	23	.54	.43	418	428
12	8	26.75	26.50	7.25	23	.54	.45	442	453
12	10	26.75	26.75	7.25	23	.54	.49	466	476
12	12	26.75	26.75	7.25	23	.54	.54	502	512
16	16	33.13	33.13	9.12	23	.62	.62	864	859
20	20	38.53	38.53	11.03	23	.68	.68	1271	1245
24	24	43.00	43.00	13.00	23	.76	.76	1828	1753

Weights are approximate. Prices on application.

STANDARD SPECIAL CASTINGS FOR GAS

CONCENTRIC REDUCERS—CAPS

A. G. I. STANDARD



No lugs on sizes under 20 inches.

CONCENTRIC REDUCERS

Nominal Diameter Inches		Dimensions in Inches				Thickness Inches		Approx. Weight Pounds
D	D1	L	N	H	E	T	T1	
14	4	32.0	20.0	4.0	8.0	.57	.40	178
14	6	32.0	20.0	4.0	8.0	.57	.43	198
18	8	32.0	20.0	4.0	8.0	.64	.45	280
18	10	32.0	20.0	4.0	8.0	.64	.49	303
24	12	37.5	26.0	3.5	8.0	.76	.54	508

CAPS

Nominal Diameter Inches	Dimensions in Inches			Approximate Weight Pounds
	L	N	T	
4	5.80	4.00	.40	25
6	7.90	4.00	.43	37
8	10.05	4.00	.45	52
10	12.10	4.00	.49	65
12	14.20	4.50	.54	95
16	18.40	4.50	.62	151
20	22.85	4.50	.68	220
24	27.05	5.00	.76	330

Weights are approximate. Prices on application.

STANDARD SPECIAL CASTINGS FOR GAS

ECCENTRIC REDUCERS

A. G. I. STANDARD

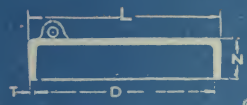
Nominal Diameter Inches		Dimensions in Inches			Thickness Inches		Approximate Weight, Pounds			
D	D^1	L	H	N	T	T^1	2 Bells	Large Bell	Small Bell	2 Spigots
4	3	20.0	7.0	6.5	.40	.39	57	44	39	26
6	3	25.0	12.0	6.5	.43	.39	80	66	55	41
6	4	20.0	7.0	6.5	.43	.40	81	63	56	38
8	4	28.0	15.0	6.5	.45	.40	117	99	84	66
8	6	20.0	7.0	6.5	.45	.43	114	89	81	56
10	4	36.0	23.0	6.5	.49	.40	160	142	122	104
10	6	28.0	15.0	6.5	.49	.43	156	131	118	93
10	8	20.0	7.0	6.5	.49	.45	148	115	110	77
12	6	37.0	23.0	7.0	.54	.43	222	198	171	148
12	8	29.0	15.0	7.0	.54	.45	212	181	162	130
12	10	21.0	7.0	7.0	.54	.49	193	158	142	107
16	8	46.0	32.0	7.0	.62	.45	388	356	304	272
16	10	38.0	24.0	7.0	.62	.49	366	331	282	247
16	12	29.0	15.0	7.0	.62	.54	344	293	259	209
20	10	54.0	40.0	7.0	.68	.49	586	551	469	434
20	12	46.0	32.0	7.0	.68	.54	569	518	451	401
20	16	30.0	16.0	7.0	.68	.62	509	425	392	308
24	16	46.5	30.5	8.0	.76	.62	792	716	641	565
24	20	30.5	14.5	8.0	.76	.68	677	572	527	421

Weights are approximate. Prices on application.

STANDARD SPECIAL CASTINGS FOR GAS

HAT FLANGES—PLUGS

A. G. I. STANDARD



No lugs on sizes under 20 inches.

HAT FLANGES

Size, Inches	Dimensions in Inches			Weight, Pounds
	L	T	O-D	
20 x 6	11.0	.43	13.50	68
20 x 8	11.0	.45	15.50	91
20 x10	11.0	.49	17.50	113
20 x12	11.0	.54	19.50	151
24 x 6	13.0	.43	13.50	67
24 x 8	13.0	.45	15.50	90
24 x10	13.0	.49	17.50	111
24 x12	13.0	.54	19.50	149

PLUGS

Size, Inches	Dimensions in Inches			Weight, Pounds
	L	N	T	
4	4.90	4.75	.40	9
6	7.00	4.75	.43	16
8	9.15	4.75	.45	24
10	11.20	4.75	.49	34
12	13.30	5.25	.54	50
16	17.50	5.25	.62	83
20	21.70	5.25	.68	127
24	25.90	5.75	.76	193

Weights are approximate Prices on application.

STANDARD SPECIAL CASTINGS FOR GAS

SPLIT SLEEVES AND HUB SLEEVES

A. G. I. STANDARD

SPLIT SLEEVE—Complete with Bolts

Nominal Diameter Inches	Dimensions in Inches				Diameter Bolts Inchs	Weight Pounds
	L	H	N	T		
2	3.38	8	2.00	.38	.63	37
3	4.80	12	4.00	.38	.63	56
4	5.80	12	4.00	.40	.63	67
6	7.90	12	4.00	.43	.63	87
8	10.05	15	4.00	.45	.63	127
10	12.10	15	4.00	.49	.63	151
12	14.20	15	4.50	.54	.63	191
16	18.40	18	4.50	.62	.75	314
20	22.85	18	4.50	.68	.75	420
24	27.05	18	5.00	.76	.75	552

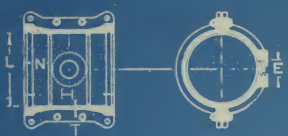
HUB SLEEVE—Complete with Bolts

Size Inches	Dimensions in Inches					Weight Pounds
	L	H	N	E	T	
10 x 4	12.10	15	4.00	6.54	.49	170
10 x 6	12.10	15	4.00	6.54	.49	196
12 x 4	14.20	15	4.50	7.64	.54	208
12 x 6	14.20	15	4.50	7.64	.54	238
16 x 6	18.40	18	4.50	9.82	.62	343
16 x 8	18.40	18	4.50	9.82	.62	352
20 x 6	22.85	18	4.50	12.10	.68	441
20 x 8	22.85	18	4.50	12.10	.68	448
20 x10	22.85	18	4.50	12.10	.68	451

STANDARD SPECIAL CASTINGS FOR GAS

SERVICE SLEEVES—SOLID SLEEVES

A. G. I. STANDARD



Service Sleeve

Solid Sleeve

SERVICE SLEEVE—Complete with Bolts

Nominal Diameter Inches	Dimensions in Inches					Weight Pounds
	L	H	N	E	T	
2	3.38	8	2.00	1.25 or 1.50	.38	38
3	4.80	12	4.00	1.25 or 1.50	.38	57
4	5.80	12	4.00	2.00	.40	69
6	7.90	12	4.00	3.00	.43	94
8	10.05	15	4.00	3.00	.45	133
10	12.10	15	4.00	3.00	.49	158
12	14.20	15	4.50	3.00 or 4.00	.54	201
16	18.40	18	4.50	3.00 or 4.00	.62	323

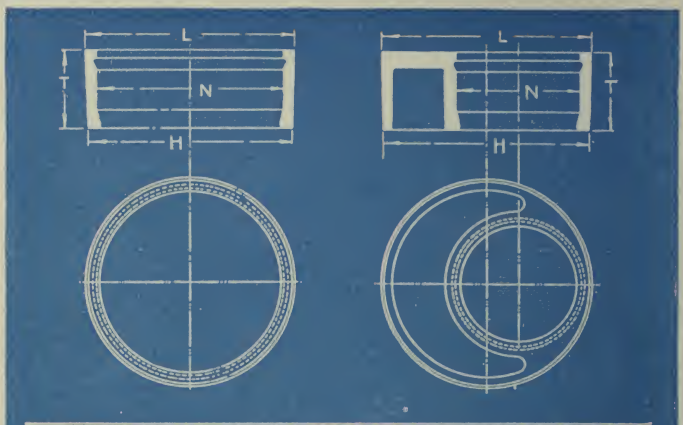
SOLID SLEEVE

Nominal Diameter Inches	Dimensions in Inches			Weight Pounds
	L	N	T	
2	3.38	8	.38	20
3	4.80	12	.38	38
4	5.80	12	.40	47
6	7.90	12	.43	65
8	10.05	15	.45	100
10	12.10	15	.49	122
12	14.20	15	.54	160
16	18.40	18	.62	269
20	22.85	18	.68	372
24	27.05	18	.76	500

Weights are approximate. Prices on application.

STANDARD SPECIAL CASTINGS FOR GAS BUSHINGS

A. G. I. STANDARD



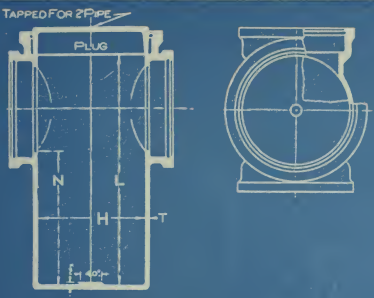
Size Inches	Dimensions in Inches				Weight Pounds
	L	H	N	T	
6 x 3	7.00	6.80	4.60	4.50	21
6 x 4	7.00	6.80	5.80	4.50	13
8 x 4	9.15	8.95	5.80	4.50	33
8 x 6	9.15	8.95	7.90	4.50	18
10 x 6	11.20	11.00	7.90	4.50	57
10 x 8	11.20	11.00	10.05	4.50	20
12 x 6	13.30	13.10	7.90	5.00	72
12 x 8	13.30	13.10	10.05	5.00	61
12 x10	13.30	13.10	12.10	5.00	28

Weights are approximate. Prices on application.

STANDARD SPECIAL CASTINGS FOR GAS

LINE DRIPS—OPEN TOPS

A. G. I. STANDARD



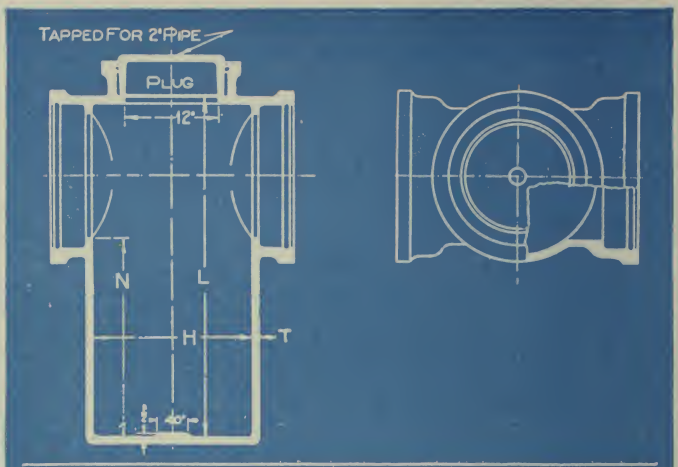
Nominal Diameter Inches	Dimensions in Inches				Size Plug Inches	Capacity Quarts	Approx. Weight Pounds
	L	H	N	T			
4	42.49	14.16	37.0	.57	14	96	467
4	30.09	14.16	24.6	.57	14	64	382
4	17.79	14.16	12.3	.57	14	32	298
6	44.59	14.16	37.0	.57	14	96	497
6	32.19	14.16	24.6	.57	14	64	412
6	19.89	14.16	12.3	.57	14	32	327
8	46.79	14.16	37.0	.57	14	96	538
8	34.39	14.16	24.6	.57	14	64	453
8	22.09	14.16	12.3	.57	14	32	369
10	48.80	14.16	37.0	.57	14	96	589
10	36.40	14.16	24.6	.57	14	64	504
10	24.10	14.16	12.3	.57	14	32	420
12	48.91	16.16	35.0	.62	16	126	766
12	37.31	16.16	23.4	.62	16	84	667
12	25.61	16.16	11.7	.62	16	42	568
16	55.18	20.24	37.0	.68	20	208	1051
16	42.78	20.24	24.6	.68	20	138	907
16	30.48	20.24	12.3	.68	20	69	764
20	60.52	24.28	38.0	.76	24	304	1500
20	47.92	24.28	25.4	.76	24	203	1304
20	35.22	24.28	12.7	.76	24	100	1107
24	60.72	30.04	34.0	.85	30	420	2070
24	49.32	30.04	22.6	.85	30	280	1826
24	38.02	30.04	11.3	.85	30	140	1583

Weight of Drips are figured without Plugs. Weights are approximate. Prices on application.

STANDARD SPECIAL CASTINGS FOR GAS

LINE DRIPS—12-INCH TOP PLUG

A. G. I. STANDARD



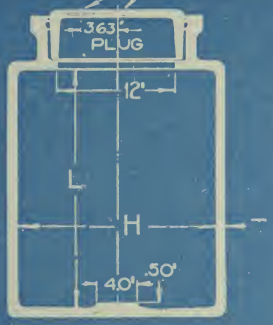
Nominal Diameter Inches	Dimensions in Inches				Capacity Quarts	Approximate Weight Pounds
	L	H	N	T		
16	55.18	20.24	37.0	.68	208	1079
16	42.78	20.24	24.6	.68	138	935
16	30.48	20.24	12.3	.68	69	792
20	60.52	24.28	38.0	.76	304	1568
20	47.92	24.28	25.4	.76	203	1372
20	35.22	24.28	12.7	.76	100	1174
24	60.72	30.04	34.0	.85	420	2215
24	49.32	30.04	22.6	.85	280	1970
24	38.02	30.04	11.3	.85	140	1728

Weights of Pots are figured without plugs. 12-inch plug is used on each of above sizes. Weights are approximate.

Prices on application.

STANDARD SPECIAL CASTINGS FOR GAS SIDE POTS

A. G. I. STANDARD

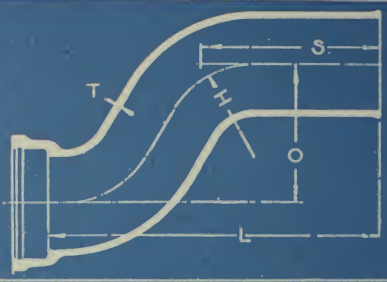


Nominal Diameter Inches	Dimensions in Inches			Capacity Quarts	Approximate Weight Pounds
	L	H	T		
4	18	16.16	.62	63	278
6	18	16.16	.62	63	278
8	18	16.16	.62	63	278
10	24	20.24	.68	130	455
12	24	20.24	.68	130	455
16	24	20.24	.68	130	455
20	24	20.24	.68	130	455
24	36	24.28	.76	282	810

Weight of Pots are figured without Plugs. Weights are approximate. Prices on application.

STANDARD SPECIAL CASTINGS FOR GAS OFFSETS

A. G. I. STANDARD



Nominal Diameter Inches	Offset Inches	Dimensions in Inches			Approximate Weight Pounds
	O	L	H	T	
4	6	30.67	4	.40	73
4	12	34.14	4	.40	83
4	18	37.60	4	.40	93
6	6	31.92	6	.43	113
6	12	35.39	6	.43	129
6	18	38.85	6	.43	145
8	6	33.74	8	.45	162
8	12	36.65	8	.45	182
8	18	40.11	8	.45	204
10	6	35.18	10	.49	216
10	12	37.80	10	.49	234
10	18	41.26	10	.49	270
12	6	36.54	12	.54	294
12	12	39.06	12	.54	323
12	18	42.52	12	.54	362
16	6	39.01	16	.62	470
16	12	42.80	16	.62	510
16	18	45.13	16	.62	570
20	6	41.17	20	.68	616
20	12	45.95	20	.68	623
20	18	48.43	20	.68	705

All weights are approximate. Prices on application.

PRESSURE IN POUNDS PER SQUARE INCH CORRESPONDING TO HEADS OF WATER IN FEET

Head Ft.	0	1	2	3	4	5	6	7	8	9
0	.....	0.433	0.866	1.299	1.732	2.165	2.598	3.031	3.464	3.897
10	4.330	4.763	5.196	5.629	6.062	6.495	6.928	7.361	7.794	8.227
20	8.660	9.093	9.526	9.959	10.392	10.825	11.258	11.691	12.124	12.557
30	12.990	13.423	13.856	14.289	14.722	15.155	15.588	16.021	16.454	16.887
40	17.320	17.753	18.186	18.619	19.052	19.485	19.918	20.351	20.784	21.217
50	21.650	22.083	22.516	22.949	23.382	23.815	24.248	24.681	25.114	25.547
60	25.980	26.413	26.846	27.279	27.712	28.145	28.578	29.011	29.444	29 877
70	30.310	30.743	31.176	31.609	32.042	32.475	32.908	33.341	33.774	34.207
80	34.640	35.073	35.506	35.939	36.372	36.805	37.238	37.671	38.104	38.537
90	38.970	39.403	39.836	40.269	40.702	41.135	41.568	42.001	42.436	42.867

HEADS OF WATER IN FEET, CORRESPONDING TO PRESSURES IN POUNDS PER SQUARE INCH

Pressure Lbs. per Sq. In.	0	1	2	3	4	5	6	7	8	9
0	.....	2.309	4.619	6.928	9.238	11.547	13.857	16.166	18.476	20.785
10	23.095	25.404	27.714	30.023	32.333	34.642	36.952	39.261	41.570	43.880
20	46.189	48.499	50.808	53.118	55.427	57.737	60.046	62.356	64.665	66.975
30	69.284	71 594	73.903	76.213	78.522	80.831	83.141	85.450	87.760	90.069
40	92.379	94.688	96 998	99.307	101.62	103.93	106.24	108.55	110.85	113.16
50	115.47	117 78	120.09	122 40	124 71	127..02	129.33	131.64	133.95	136.26
60	138.57	140 88	143.19	145.50	147.81	150.12	152.42	154.73	157.04	159.35
70	161.66	163.97	166.28	168.59	170.90	173.21	175.52	177.83	180.14	182.45
80	184.76	187.07	189.38	191.69	194.00	196.31	198 61	200.92	203.23	205.54
90	207.85	210.16	212.47	214.78	217.09	219.40	221.71	224.02	226.33	228.64

At 62° F., 1 foot head equals 0.433 lb. per square inch; 0.433 times 144 equals 62.355 lbs. per cubic foot.

1 lb. per square inch equals 2,30947 feet head.

1 Atmosphere equals 14.7 lbs. per square inch equals 33.94 feet head.

RELATIVE DELIVERY OF WATER

Nominal Diam. Inches	Relative Flow Capacities of Full Smooth Pipe — Dimensions, Inches										Diam. Feet	Relative Flow Capac.
	4	6	8	10	12	14	16	18	20	24		
24		32.0	15.6	8.9	5 66	3.85	2.76	2.05	1.58	1.0	2.00	5.657
20	56.0	20.28	9.9	5.66	3.6	2.44	1.75	1 3	1.0		1.67	3.586
18	43.0	15.6	7.6	4.35	2.76	1.87	1.34	1.0			1.50	2 756
16	32.0	11.6	5.7	3.24	2.05	1.40	1.0				1.33	2.053
14	23.0	8.3	4.05	2 32	1.47	1.0					1 18	1 47
12	15.6	5.66	2 76	1.58	1.0						1 0	1 0
10	9 9	3.6	1 75	1.0							0.83	0 634
8	5.66	2.05	1.0								0.67	0 363
6	2 76	1.0									0.5	0.177
4	1.0										0.33	0.064

Relative flow capacity is based arbitrarily 1.0 for 12-inch pipe.

These calculations based on assumption that relative deliveries at same loss of head are to each other as 5–2 power of the respective examples.

EXAMPLE:—To find how many six-inch pipes will equal the total flow capacity of one 20-inch pipe: Reading horizontially from 20 to intersection, table shows 20.28 6-inch pipe required or in practice 21 6-inch pipe equal one 20-inch pipe.

LEAD AND JUTE REQUIRED

Approximate Quantities per Joint

Diameter of Pipes Inches	Pounds of Lead	Pounds of Jute
3	6.00	.18
4	7.50	.21
6	10.25	.31
8	13.25	.44
10	16.00	.53
12	19.00	.63
14	22.00	.81
16	30.00	.94
18	33.80	1.00
20	37.00	1.25
24	44.00	1.50

AREA OF CIRCLE

Dia.	Area	Dia.	Area	Dia.	Area	Dia.	Area
1/8	0.0123	10	78.54	30	706.86	65	3318.8
1/4	0.0491	10 1/2	86.59	31	754.76	66	3421.2
3/8	0.1104	11	95.03	32	804.24	67	3525.6
1/2	0.1963	11 1/2	103.86	33	855.30	68	3631.6
5/8	0.3068	12	113.09	34	907.92	69	3739.2
3/4	0.4418	12 1/2	122.71	35	962.11	70	4848.4
7/8	0.6013	13	132.73	36	1017.8	71	3959.2
1	0.7854	13 1/2	143.13	37	1075.2	72	4071.5
1 1/8	0.9940	14	153.93	38	1134.1	73	4185.4
1 1/4	1.227	14 1/2	165.13	39	1194.5	74	4300.8
1 3/8	1.484	15	176.71	40	1256.6	75	4417.8
1 1/2	1.767	15 1/2	188.69	41	1320.2	76	4536.4
1 5/8	2.073	16	201.06	42	1385.4	77	4656.6
1 3/4	2.405	16 1/2	213.82	43	1452.2	78	4778.3
1 7/8	2.761	17	226.98	44	1520.5	79	4901.6
2	3.141	17 1/2	240.52	45	1590.4	80	5026.5
2 1/4	3.976	18	254.46	46	1661.9	81	5153.0
2 1/2	4.908	18 1/2	268.80	47	1734.9	82	5281.0
2 3/4	5.939	19	283.52	48	1809.5	83	5410.6
3	7.068	19 1/2	298.64	49	1885.7	84	5541.7
3 1/4	3.295	20	314.16	50	1963.5	85	5674.5
3 1/2	9.621	20 1/2	330.06	51	2042.8	86	5808.8
3 3/4	11.044	21	346.36	52	2123.7	87	5944.6
4	12.566	21 1/2	363.05	53	2206.1	88	6082.1
4 1/2	15.904	22	380.13	54	2290.2	89	6221.1
5	19.635	22 1/2	397.60	55	2375.8	90	6361.7
5 1/2	23.758	23	415.47	56	2463.0	91	6503.9
6	28.274	23 1/2	433.73	57	2551.7	92	6647.6
6 1/2	33.183	24	452.39	58	2642.0	93	6792.9
7	38.484	24 1/2	471.43	59	2733.9	94	6939.8
7 1/2	44.178	25	490.87	60	2827.4	95	7088.2
8	50.265	26	530.93	61	2922.4	96	7238.2
8 1/2	56.745	27	572.55	62	3019.0	97	7389.8
9	63.617	28	615.75	63	3117.2	98	7542.9
9 1/2	70.882	29	660.52	64	3216.9	99	7697.7

To compute area of a diameter not shown above:

RULE:—Divide the dimension by a factor which will reduce to a quotient found in the table, then multiply area of the quotient by square of factor.

Thus,—120 divided by 2 equals 60. Area of 60 equals 2827.4. Multiply by 4 equals 11309.6. Area of circle, 120 units in diameter.

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DIFFERENTIAL LIST

BELL AND SPIGOT PIPE EXTRAS:	
16-foot lengths	$1.60 ton
L. C. L. shipments, all lengths	2.50 ton
4-inch pipe	3.00 ton
3-inch pipe	10.00 ton
Class A or Gas Pipe	2.00 ton
BELL AND SPIGOT FITTINGS EXTRAS:	
Fittings only, L. C. L.	1c pound
Fittings with pipe, L. C. L.	½c pound
Tees and Crosses with one or more spigot ends	¼c pound
Double Bell Bends	¼c pound
Reducers with Bell on large end	¼c pound
Cutting in Tees and Crosses	1c pound
Base Ells and Base Tees	1c pound
Blow-Off Branches	1c pound
Drip Pots	1c pound
Double Spigot or Double Bell Reducers	1c pound
Double Spigot Bends	1c pound
Split Sleeve	2c pound
FLANGED PIPE EXTRAS:	
L. C. L. shipments	$2.50 ton
Class A and Gas Thickness, 3 inches	60.00 ton
Class A and Gas Thickness, 4 inches	5.00 ton
Class A and Gas Thickness, 6 inches and larger	2.50 ton
FLANGED FITTINGS EXTRAS:	
Fittings only, L. C. L.	1c pound
Fittings with pipe, L. C. L.	½c pound
All Standard Gas Fittings	¼c pound
Tees, Crosses and Elbows Reducing on Run or Branch	1c pound
DRILLING AND TAPPING:	
Minimum charge up to 1 inch	$1.00
Each additional ¼ inch or fraction	25c

CUTTING PIPE TO SIX-FOOT LENGTHS (Per Cut)

3″, 4″, 40c; 5″, 50c; 6″, 8″, 60c; 10″, 80c; 12″, 14″, $1.25; 16″, 18″, $1.50; 20″, $1.90.

DEDUCTIONS:

Flange Pipe 14″ and larger in quantities of 6 or more pieces of a size, $5.00 per ton under list price for the size.

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